MONITORING YEAR 1 ANNUAL REPORT
Final

NORKETT BRANCH STREAM MITIGATION SITE
Union County, NC
DENR Contract 004673
NCEEP Project Number 95360

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EXECUTIVE SUMMARY

Wildlands Engineering (Wildlands) restored and enhanced a total of 10,891 linear feet (LF) of stream on a full-delivery mitigation site in Union County, NC. The project streams consist of Norkett Branch, a third order stream, two unnamed first order tributaries to Norkett Branch (UT1 and UT2), and two intermittent tributaries to Norkett Branch (UT2A and UT3). Water quality treatment Best Management Practices (BMPs) are proposed to treat water quality on the non-jurisdictional headwaters of UT3 and an adjacent ephemeral drainage feature. The project will provide 10,098 stream mitigation units (SMUs).

The Norkett Branch Stream Mitigation Site (Site) is located in southeastern Union County, NC, approximately ten miles southeast of the City of Monroe and five miles north of the South Carolina state line. The Site is located in the Yadkin River Basin; eight digit Cataloging Unit (CU) 03040105 and the 14-digit Hydrologic Unit Code (HUC) 03040105081020 (Figure 1). This CU was identified as a targeted local watershed in NCEEP's *2009 Lower Yadkin- Pee Dee River Basin Restoration Priority* (RBRP) plan. This RBRP plan identifies agricultural practices and runoff as the probable major sources of water quality impairment in the Middle Lanes Creek watershed. The 2008 North Carolina Division of Water Resources' (NCDWR) Basinwide Water Quality Plan (BWQP) lists turbidity and nutrient concentrations of nitrogen and phosphorus as specific concerns in the Rocky River watershed portion of the Yadkin- Pee Dee River basin. Other pollutants of concern cited in this report are fecal coliform bacteria, iron, and copper. The project reaches flow off-site, directly into Lanes Creek, which is included on the NCDWR 303d list of impaired streams. The section of Lanes Creek downstream of the project Site is listed as impaired due to turbidity (NCDWR, 2012). The project goals established in the Mitigation Plan (Wildlands, 2013) were completed with careful consideration of goals and objectives that were described in the RBRP and NCDWR BWQR and to meet the North Carolina Ecosystem Enhancement Program's (NCEEP) mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project goals were established to address the effects listed above in the executive summary from watershed and project Site stressors:

- Improve aquatic and terrestrial habitat within the riparian corridor and provide habitat corridor extension from adjacent downstream forested habitat;
- Improve additional water quality aspects within stream channels on Site;
- Decrease sediment inputs to the stream channels and decrease turbidity in receiving Lanes Creek; and
- Decrease phosphorus, nitrogen, and fecal coliform inputs to the stream channels.

Restoration and enhancement, planting, and water quality treatment BMP construction efforts were completed between November 2013 and April 2014. Baseline as-built monitoring activities were completed between April and May 2014. A conservation easement is in place on the 31.6 acres of riparian corridor and stream resources to protect them in perpetuity.

Monitoring Year 1 (MY1) assessment and Site visits were completed between September and October 2014 to assess the conditions of the Site. Overall, the Site has met the required hydrologic, vegetation, and stream success criteria for MY1. The Site's overall average stem density of 537 stems/ acre is greater than the 320 stem/ acre density required for MY1. All restored and enhanced streams are stable and functioning as designed, and the Site has met one of the 2 bankfull events required for the Monitoring Year 5 (MY5) hydrology success criteria.

TABLE OF CONTENTS

APPENDICES

Section 1: PROJECT OVERVIEW

The Site is located in southeastern Union County, NC, approximately ten miles southeast of the City of Monroe and five miles north of the South Carolina state line. The Site is located in the Yadkin River Basin; eight digit Cataloging Unit (CU) 03040105 and the 14-digit Hydrologic Unit Code (HUC) 03040105081020 (Figure 1). The Site is located in the Carolina Slate Belt of the Piedmont physiographic province. (USGS, 1998). The project watershed consists primarily of agricultural land, pasture, and forest. The Site is located on agricultural tracts owned by Marie S. Autry (PIN 03060001A), Kay A. and Lane Haigler (PIN 03081007C; PIN 03081013; PIN 03081014), The Cox Farms Irrevocable Trust (PIN 03081010), John H. and Peggy S. Autry (3081007D), and Marion, Delano, Ruth, and John (Sr.) Cox (PIN 03081012), where the surrounding land is primarily used for pasture, and rotating soybean, corn and hay fields. A conservation easement was recorded on 31.6 acres within the seven parcels (Deed book 06095, Pages 0530-0589).

The Site is located within the North Carolina Division of Water Resources (NCDWR) subbasin 03-07-14. The project streams consist of Norkett Branch, a third order stream, two unnamed first order tributaries to Norkett Branch (UT1 and UT2), and two intermittent tributaries to Norkett Branch (UT2A and UT3). Norkett Branch (DWQ Index No. 13-17-40-8) is the main tributary of the project and is classified as WS-V waters. Class WS-V waters are protected as water supplies draining to Class WS-IV waters or waters used by industry to supply drinking water or waters formerly used as water supply, and are protected for secondary recreation, fishing, wildlife and aquatic life, maintenance of biotic integrity, and agriculture. The drainage area for the project Site is 2,034 acres (3.18 sq mi) at the lower end of Norkett Branch Reach 2.

Mitigation work at the Site included full restoration on Norkett Branch, UT1, and UT2. Enhancement II was implemented on UT2A and UT3. Water quality treatment BMPs were implemented to treat agricultural drainage upstream of UT3 and agricultural drainage in the right floodplain of Norkett Branch Reach 2. All onsite riparian areas were planted with native species. Construction and planting activities were completed in April 2014. Directions and a map of the Site are provided in Figure 1 and project components are illustrated in Figure 2.

1.1 Project Goals and Objectives

Prior to construction activities, the streams were routinely maintained to provide drainage for agricultural purposes. Impacts to the stream included straightening and ditching, eroding banks, and a lack of stabilizing riparian vegetation. The stream was used as a water source for cattle in some areas, resulting in over-widened, unstable trampled banks. Algal blooms, presumably from agricultural nutrient loading, were observed during Site visits. Trampled stream banks, over-widened channels, and banks illustrating signs of instability were a common occurrence throughout the Site. The alterations of the Site to promote farming resulted in impairment of the ecological function of Site's streams. Specific functional losses at the Site include degraded aquatic habitat, altered hydrology, and reduction of quality of in-stream and riparian wetland habitats and related water quality benefits. Table 4 in Appendix 1 and Tables 10a-c in Appendix 4 present the Site's pre-restoration conditions in detail.

The mitigation project is intended to provide numerous ecological benefits such as pollutant removal and improved aquatic and terrestrial habitat. Expected improvements to water quality and ecological processes are outlined below as project goals and objectives. The agricultural stressors and pollutants have been specifically addressed by the Site design. The major goals of the stream mitigation project are to provide ecological and water quality enhancements to the Norkett Branch, Rocky River and Yadkin River

Basins while creating a functional riparian corridor at the Site level and restoring a Piedmont Bottomland Forest as described by Schafale and Weakley (1990). These project goals were established with careful consideration of goals and objectives that were described in the RBRP and to meet the North Carolina Ecosystem Enhancement Program's (NCEEP) mitigation needs while maximizing the ecological and water quality uplift within the watershed.

The following project goals and objectives were established and listed in the Mitigation Plan (approved 2013) to address the effects listed above and in the executive summary from watershed and project Site stressors:

- *Improve aquatic and terrestrial habitat within the riparian corridor and provide habitat corridor extension from adjacent downstream forested habitat.* By restoring appropriate channel cross-section and profile, including riffle and pool sequences, coarse substrate zones for macroinvertebrates and deep pool habitat for fish will also be restored. Introduction of large woody debris, rock structures, brush toe, and native stream bank vegetation will provide additional habitat and cover for both fish and macroinvertebrates. Adjacent buffer areas will be restored by planting native vegetation which will provide habitat and forage for terrestrial species. These areas will be allowed to receive more regular inundating flows, and vernal pools may develop over time increasing habitat diversity. A watershed approach, restoring riparian corridor functions on multiple interconnected tributaries as well as treating agricultural drainage from headwater features with Best Management Practices (BMPs), will allow for large-scale riparian corridor connectivity.

- *Improve additional water quality aspects within stream channels on Site.* Riffle/pool sequences will be restored to provide re-aeration for oxygen levels to be maintained in the perennial reaches. Creation of deep pool zones will lower temperature, helping to maintain dissolved oxygen concentrations. Establishment and maintenance of riparian buffers will create long-term shading of the stream to minimize thermal heating. Water quality BMPs situated in the headwaters of jurisdictional streams will treat agricultural runoff before it reaches project stream reaches.

- *Decrease sediment inputs to the stream channels and decrease turbidity in receiving Lanes Creek.* Cattle will be fenced out of the riparian corridor, eliminating bank trampling. Sediment input from eroding stream banks will be reduced by installing bioengineering and in-stream structures while creating a stable channel form using geomorphic design principles. Sediment from off-site sources will be captured by deposition on restored floodplain areas where native vegetation will slow overland flow velocities. By allowing for more overbank flooding and by increasing channel roughness, in-channel velocities can be reduced. This will lower bank shear stress and decrease bank erosion.

- *Decrease phosphorus, nitrogen, and fecal coliform inputs to the stream channels.* Nitrogen and phosphorus chemical fertilizers, pesticides, and cattle waste will be decreased by buffering adjacent agricultural operations from the restored channels. Cattle will be fenced out to eliminate in-channel fecal pollution. Off-site nutrient input will be absorbed on-site by filtering flood flows through restored floodplain areas, water quality BMPs, and vernal pools positioned to treat concentrated overland flow. Flood flows will be allowed to disperse through native vegetation across the reconnected floodplain. Increased surface water residency time will provide contact treatment time and groundwater recharge potential.

1.2 Monitoring Year 1 Data Assessment

Annual monitoring and quarterly site visits were conducted during September and October 2014 to assess the condition of the project. The stream restoration success criteria for the Site follows the approved success criteria presented in the Mitigation Plan (approved 2013).

1.2.1 Vegetative Assessment

A total of 26 vegetation plots were established during the baseline monitoring within the project easement area using standard 10 meter by 10 meter vegetation monitoring plots. Plots were randomly established within planted portions of the stream restoration and enhancement areas to capture the heterogeneity of the designed vegetative communities. The plot corners were marked and are recoverable either through field identification or with the use of a GPS unit. Reference photographs were taken at the plot origin looking diagonally across the plot to the opposite corner to capture the same reference photograph locations as the as-built. The final vegetative success criteria will be the survival of 210 planted stems per acre in the riparian corridor along restored and enhanced reaches at the end of the seventh year of monitoring (MY7). Planted vegetation must average 10 feet in height in each plot by MY7. The interim measure of vegetative success for the Site will be the survival of at least 320 planted stems per acre at the end of the third year of monitoring (MY3) and at least 260 stems per acre at the end of the fifth year of monitoring (MY5). If this performance standard is met by MY5 and stem density is trending towards success (i.e., no less than 260 five year old stems/acre), monitoring of vegetation on the Site may be terminated provided written approval is provided by the USACE in consultation with the NC Interagency Review Team.

The MY1 vegetation survey was completed in September 2014 and resulted in 25 vegetation plots meeting the success criteria requirement. For MY1, the average stem density resulted in 537 stems per acre which exceeds the 320 stems/acre success criteria. Although the Site meets the overall stem density requirement, one vegetation plot (plot 7) has a stem density of 283 stems/acre. While this value does not meet the success criteria for this monitoring period, it does exceed the MY5 required stem density. The low stem survival in this plot is presumably due to a combination of species assemblage, planting stress, water stress, and floodplain scour in the area. Surface soil was washed over and herbaceous cover was low in this area. Volunteer recruitment and re-sprouting of planted stems may allow this plot to attain the final success criteria without additional planting. Volunteers are not included in the Site's stem density results because no volunteer woody stems were observed in MY1, however volunteer recruitment may improve stem density in future monitoring years. Please refer to Appendix 3 for vegetation summary tables and raw data tables and Appendix 2 for vegetation plot photographs and the vegetation condition assessment table.

1.2.2 Vegetation Areas of Concern

The MY1 vegetation monitoring and visual assessment revealed several sparsely vegetated areas with poor establishment of herbaceous cover, which will be watched for progression in the upcoming monitoring year. In addition, woody stem vigor appears to be weak throughout the project, with 53% of observed stems receiving a rating of 3 or more (indicating that the stem is healthy and likely to survive), and 35% of observed stems receiving a rating of 1 or less (indicating that the stem is dead or unlikely to survive). The vigor of the planted stems appears to be species dependent. The best performing species were American sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), and river birch (*Betula nigra*). Less viable species were flowering dogwood (*Cornus florida*), eastern redbud (*Cercis*

Canadensis), tuliptree (*Liriodendron tulipifera*), and common elderberry (*Sambucus canadensis*). If these planted stems vigor do not improve in future monitoring years, Wildlands will prepare a plan to address these areas. Please refer to Appendix 2 for vegetation plot photos, Appendix 3 for vegetation data tables, and Figures 3.0-3.3 for the Current Condition Plan View Maps (CCPV), which outline the areas of concern.

Maintenance Plan

Areas with bare herbaceous cover will be reseeded with native grasses, in January 2015. Hay bales and coir logs will be installed at this time to reduce rill erosion in areas of concentrated flow. Wildlands will conduct supplemental planting in areas with poor growth rates and low vigor ratings, including bare roots, live stakes and native grasses in February 2015. Visual assessment will be performed during MY2 to determine if any additional maintenance is necessary to promote survival of planted woody stems.

1.2.3 Stream Assessment

Morphological surveys for MY1 were conducted in October 2014. All streams within the Site appear stable and have met the success criteria for MY1. Riffle cross-sections surveyed along the restoration reaches appear stable and show little to no change in the bankfull area, maximum depth ratio, or width-to-depth ratio. All surveyed riffle cross-section dimensions fell within the parameters defined for channels of the appropriate Rosgen stream type (Rosgen 1994). In-stream structures used to enhance channel habitat and stability on the outside bank of meander bends, such as brush toe, are providing stability and habitat as designed. Pattern data will only be completed in MY5 if there are indicators from the dimensions that significant geomorphic adjustments have occurred. No changes were observed that indicated a change in the radius of curvature or channel belt width; therefore, pattern data is not included in the MY1 report.

In general, substrate materials in the restoration reaches indicate maintenance of coarser materials in the riffle features and finer particles in the pool features. In most riffle cross-sections, the particle size distribution for MY1 is coarser than MY0, with the exception of riffle cross-sections 6 and 18 which show an increase in the silt/clay and sand particle class sizes and cross-section 3 which shows an increase in the gravel particle class sizes. The increase in fine substrate is likely due to deposition from the floodplain rill-erosion, as well as runoff from a recently clear-cut parcel immediately upstream from the project. Substrate materials are expected to coarsen in future monitoring years after dense vegetation becomes established in the floodplain.

The stream Please refer to Appendix 2 for the stream visual assessment tables, the CCPV map, reference photographs. Refer to Appendix 4 for the morphological data and plots.

1.2.4 Stream Areas of Concern

The following stream problem areas were identified as Areas of Concern (AOC): Bare banks were observed on UT2 Reach 3B near station 338+00 (AOC-1: 21 ft. total length on left bank) and on Norkett Branch Reach 1 near station 119+00 (AOC-2: 51 ft. total length on left bank). Rill erosion is occurring on Norkett Branch Reach 1 near station 124+00 (AOC-3: 53 ft. total length on right bank). Bare banks are occurring on Norkett Branch Reach 2 near station 133+00 (AOC-4: 54 ft. total length on left bank and AOC-5: 58 ft. total length on right bank). Bare banks and loose matting were observed on Norkett Branch Reach 1 near station 105+50 (AOC-6: 38 ft. total length on right bank). Minor rill erosion is occurring sporadically where banks and floodplain are not yet densely vegetated. These areas are expected to recover after vegetation becomes established and will be closely monitored for progression in MY2. Please refer to Appendix 2 for the stream visual assessment tables, the CCPV map, reference photographs, and photographs of the stream problem areas.

1.2.5 Hydrology Assessment

To meet hydrological success criteria, two or more bankfull events must occur in separate years within the restored reaches by the end of MY5. During MY1, bankfull or greater events were recorded in all reaches. This is the first year of a recorded bankfull or greater event, therefore the success criteria is not yet met for the five-year monitoring period. Please refer to Appendix 5 for hydrologic data.

1.2.6 Water Quality BMPs

Water quality grab samples were collected during the monitoring period to assess the functionality of the step pool stormwater conveyance BMP (SPSC BMP) and the pocket wetland BMP (PW BMP). Inflow and outflow was sampled at each BMP after multiple 1 inch storm events. The sampled storm events were collected on May 15, 2014 (1.9 inches), October 15, 2014 (0.6 inches), and November 26, 2014 (1.02 inches), with rainfall amounts measured by an Onset HOBO rain gauge located at the site. Wildlands staff measured temperature, pH and electrical conductivity *in-situ* using a calibrated YSI Model 63 Handheld Probe. Water grab samples were analyzed for nitrogen as total nitrogen (TN) Nitrate/Nitrite (NOx), and Total Kjeldahl Nitrogen (TKN), phosphorus as total phosphorus (TP), total suspended solids (TSS) and fecal coliform (FC) by Prism Laboratories Inc. For the purpose of this analysis, only TN, TP, and TSS are considered. This sampling is not part of the success criteria for the project. Please refer to in Appendix 6 for water quality sampling results and pollutant removal rates.

The SPSC BMP is expected to provide similar pollutant removal rates as the published removal rates of a bioretention area with internal water storage (NCDWQ, 2007), which are 85% TSS removal, 40% TN removal, and 40% TP removal. The SPSC BMP provided significant pollutant removal of TN in all three sampling events. TN removal ranged from 10% to 67%. Significant removal of TP was observed in two of the three sampling events ranging from 63% to 88% removal, with an insignificant (2%) rate of removal observed on November 26, 2014. Similarly, TSS was reduced in two of the three sampling events with removal rates of 58 to 94%. A small increase (7%) in TSS occurred during the November 26, 2014 sampling event.

Based on sparse published data, pocket wetlands provide lower pollutant removal rates than extended detention wetlands (CWP, 2000; EPA 2012). Pollutant removal rates from those sources were combined to establish the PW BMP removal rates of 60% TSS removal, 20% TN removal, and 45% TP removal. The PW BMP did not consistently provide outflow sufficient to sample surface water chemistry. Only two sampling events were able to be sampled: May 15, 2014, and November 26, 2014. Removal of TN ranged from 7% to 28% for these two events. TP was not removed at baseflow or during the storm event of 11/26/2014, with the PW BMP acting as a TP source on those sampling events. Eighteen percent TP removal was accomplished on May 15, 2014, but outflow TP was greater than inflow TP during the November 26, 2014 sampling event. Outflow TSS was greater than inflow TSS during the May 15, 2014 sampling event. The PW BMP provided marginal pollutant removal during the November 26, 2014 sampling event.

The SPSC BMP nearly met the pollutant removal goals of TN, TP, and TSS for each sampling event. The only anomaly was a slight TSS increase during the November 26, 2014 sampling event. The results for the PW BMP were more sporadic, but it is hard to detect a trend with only two sampling events. The establishment of vegetation will most likely have a significant effect on the pollutant removal capacity of each BMP, through both nutrient uptake and soil stabilization.

1.2.7 Existing Wetland Monitoring

A permanent photo point was established in the stream to wetland conversion area in Norkett Branch Reach 1 near station 104+00 on the left floodplain. The former channel area appears to be maintaining wetland hydrology and supports a dominant wetland plant community composition. The permanent photo point (PP#16) is included in the Stream Photographs section of Appendix 2.

1.3 Monitoring Year 1 Summary

The Site has met the required stream and vegetation mitigation success criteria for MY1. All restored reaches recorded at least one bankfull or greater event, and the MY5 hydrological success criteria for the Site has been partially met at this time. Geomorphically, the stability of each restored and enhanced stream remains in good standing. Visual assessment suggests the channels show little sign of instability within the bed, bank, or engineered structures and the stream survey shows little change in bankfull parameters. The average stem density for the site is 537 stems/ acre, and is on track to meet upcoming criteria.

Summary information/data related to various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting can be found in the Mitigation Plan (formerly Restoration Plan) documents available on NCEEP's website. All raw data supporting the tables and figures in the appendices is available upon request.

Section 2: METHODOLOGY

Geomorphic data collected followed the standards outlined in *The Stream Channel Reference Site: An Illustrated Guide to Field Techniques* (Harrelson et al., 1994) and in the *Stream Restoration: A Natural Channel Design Handbook* (Doll et al., 2003). Longitudinal and cross-sectional data were collected using a total station and were georeferenced to established benchmarks and NC State Plane coordinates. Morphological surveys were conducted using a total station tied to these geo-referenced (control) points. Reachwide pebble counts were conducted along each restored reach for channel classification. Cross-section substrate analyses conducted in each surveyed riffle followed the 100 count wetted perimeter methodology to characterize pavement. All CCPV mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using was Pathfinder and ArcView. Crest gages were installed during the baseline monitoring period in surveyed riffle cross-sections and are monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-NCEEP Level 2 Protocol (Lee et al., 2006).

Section 3: REFERENCES

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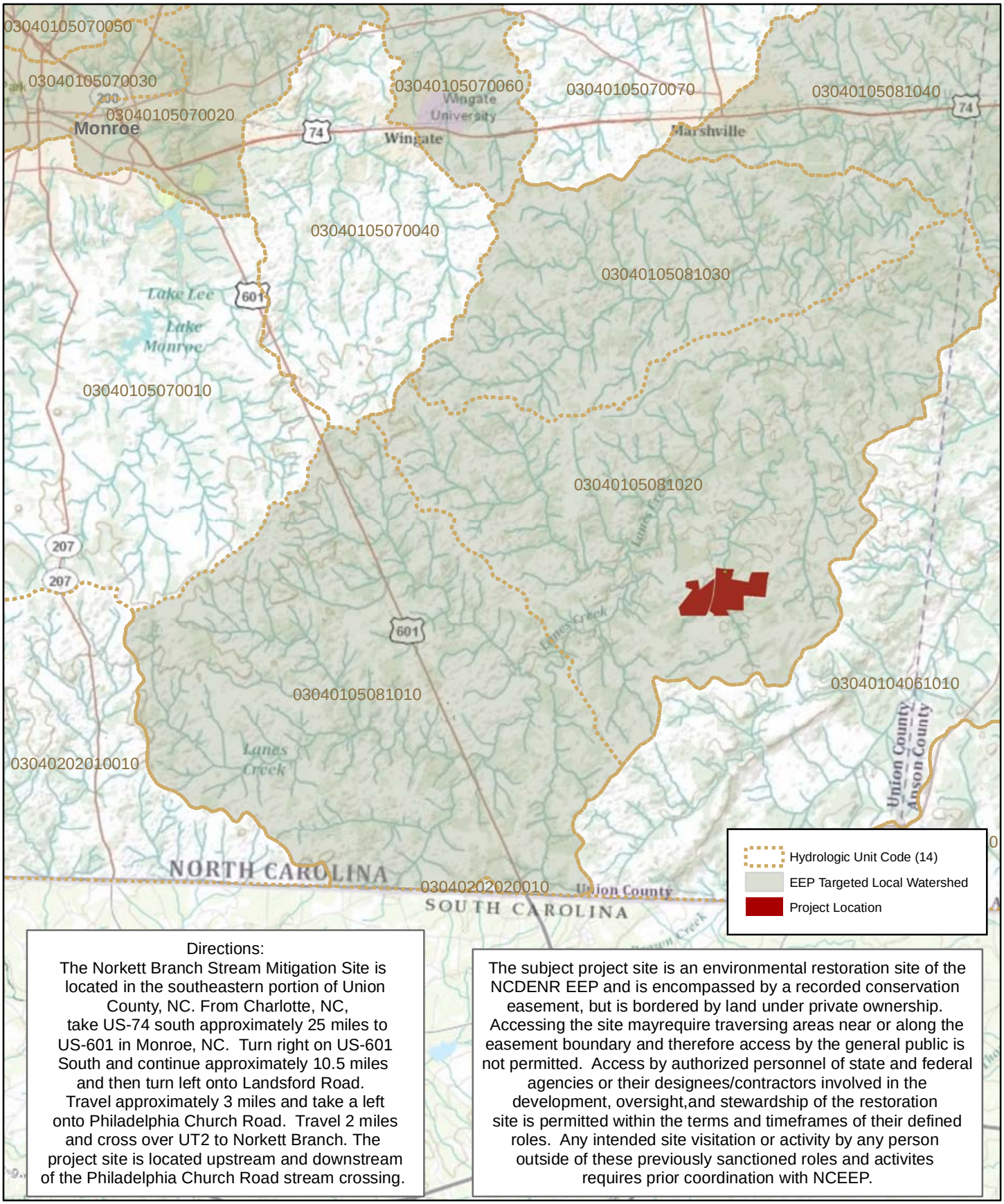
APPENDIX 1. General Tables and Figures



Directions:
The Norkett Branch Stream Mitigation Site is located in the southeastern portion of Union County, NC. From Charlotte, NC, take US-74 south approximately 25 miles to US-601 in Monroe, NC. Turn right on US-601 South and continue approximately 10.5 miles and then turn left onto Landsford Road. Travel approximately 3 miles and take a left onto Philadelphia Church Road. Travel 2 miles and cross over UT2 to Norkett Branch. The project site is located upstream and downstream of the Philadelphia Church Road stream crossing.

The subject project site is an environmental restoration site of the NCDENR EEP and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site mayrequire traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight,and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activites requires prior coordination with NCEEP.

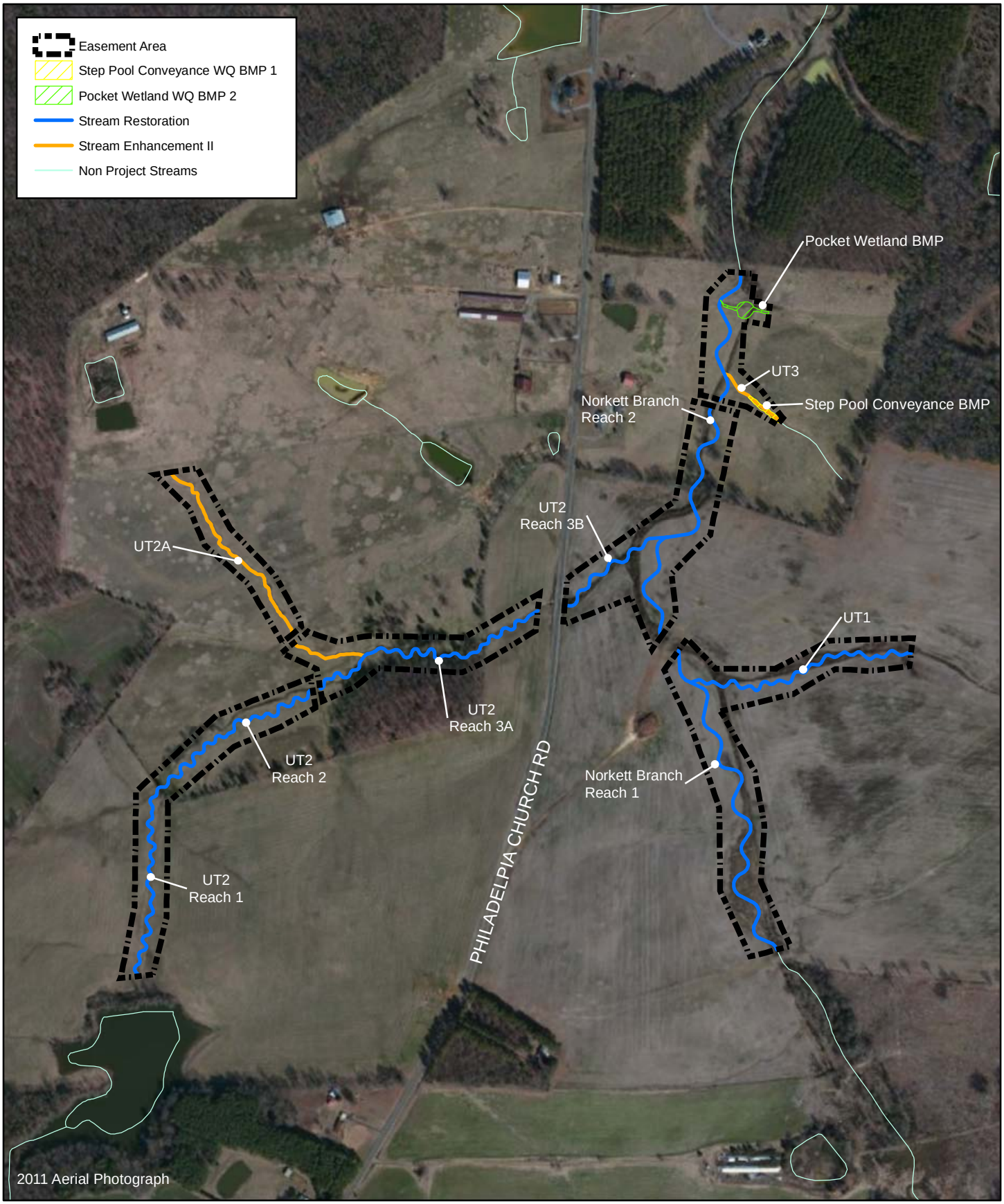
WILDLANDS ENGINEERING

Ecosystem Enhancement Program

0 1 2 Miles

N

Figure 1 Vicinity Map
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC



WILDLANDS ENGINEERING

Ecosystem Enhancement Program

0 300 600 Feet

N

Figure 2 Project Component / Asset Map
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC

Table 1. Project Components and Mitigation Credits
Norkett Branch Stream Mitigation Site (NCEEP Project No.95360)
Monitoring Year 1

Mitigation Credits									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	9,196	902	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Project Components							
Reach ID	Design/As-Built Alignment Stationing[1]	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage[2]	Mitigation Ratio	Credits (SMU)[2]
Streams							
Norkett Branch Reach 1	100+31-117+60 & 118+60-124+00	1,980 LF	P1	Restoration	2,313	1:1	2,313
Norkett Branch Reach 2	124+00-131+84 & 132+25-138+99	1,505 LF	P1	Restoration	1,513	1:1	1,513
UT1	200+00-211+98	840 LF	P1	Restoration	1,212	1:1	1,212
UT2 Reach 1	300+41-310+80	820 LF	P1	Restoration	1,033	1:1	1,033
UT2 Reach 2	310+80-321+71 & 322+06-325+20	1,272 LF	P1	Restoration	1,416	1:1	1,416
UT2 Reach 3A	325+20-335+58	923 LF	P1	Restoration	1,041	1:1	1,041
UT2 Reach 3B	336+90-343+48	380 LF	P1/2	Restoration	668	1:1	668
UT2A	401+53-411+46 & 411+84-415+31	1,296 LF	EII	Enhancement II	1,340	2.5:1	536
UT3	505+42-507+12	163 LF	EII	Enhancement II	170	2.5:1	68
WQ BMP 1	Upstream of UT3 intermittent drainage		Step Pool Conveyance	WQ BMP	29.7 ac treated	1:8	238[3]
WQ BMP 2	non-jurisdictional drainage in eastern Norkett Branch floodplain		Pocket Wetland	WQ BMP	19.9 ac treated	1:3	60[3]

Component Summation						
Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer (square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	9,196	-	-	-	-	-
Enhancement		-	-	-	-	-
Enhancement I						
Enhancement II	1,510					
Creation		-	-	-		
Preservation	-	-	-	-		-
High Quality Preservation	-	-	-	-		-
Alternative Mitigation	49.6 ac treated					

N/A: not applicable

1. Stationing based off of centerline as-built alignment which matched with the design alignment.
2. Credits are based off of the as-built thalweg alignment.
3. Credits determined for the BMPs were established in the mitigation plan (2013).

Table 2. Project Activity and Reporting History
Norkett Branch Stream Mitigation Site (NCEEP Project No.95360)
Monitoring Year 1

Activity or Report	Data Collection	Completion or Scheduled
Mitigation Plan	July 2012-October 2012	July 2013
Final Design - Construction Plans	July 2013-November 2013	November 2013
Construction	December 2013- April 2014	April 2014
Temporary S&E mix applied to entire project area[1]	December 2013- April 2014	April 2014
Permanent seed mix applied to reach/segments	December 2013- April 2014	April 2014
Bare root and live stake plantings for reach/segments	March 2014 - April 2014	April 2014
Baseline Monitoring Document (Year 0)	April 2014 - May 2014	June 2014
Year 1 Monitoring	September 2014 - October 2014	December 2014
Maintenance and Replanting	October 2014-January 2014	February 2015
Year 2 Monitoring	2015	December 2015
Year 3 Monitoring	2016	December 2016
Year 4 Monitoring	2017	December 2017
Year 5 Monitoring	2018	December 2018
Year 6 Monitoring	2019	December 2019
Year 7 Monitoring	2020	December 2020

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contact Table
Norkett Branch Stream Mitigation Site (NCEEP Project No.95360)
Monitoring Year 0

Designer	**Wildlands Engineering, Inc.**
Emily Reinicker, PE, CFM	1403 S Mint St. Suite 104 Charlotte, NC 28203 704.332.7754
Construction Contractor	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seed Mix Sources	**Green Resource, Colfax, NC**
Nursery Stock Suppliers **Bare Roots** **Live Stakes**	**Bruton Natural Systems, Inc** **Dykes Nursery, McMinnville, TN** **Foggy Bottom Nursery, Lansing, NC**
Monitoring Performers	**Wildlands Engineering, Inc.**
Monitoring, POC	Kirsten Gimbert 704.332.7754, ext. 110

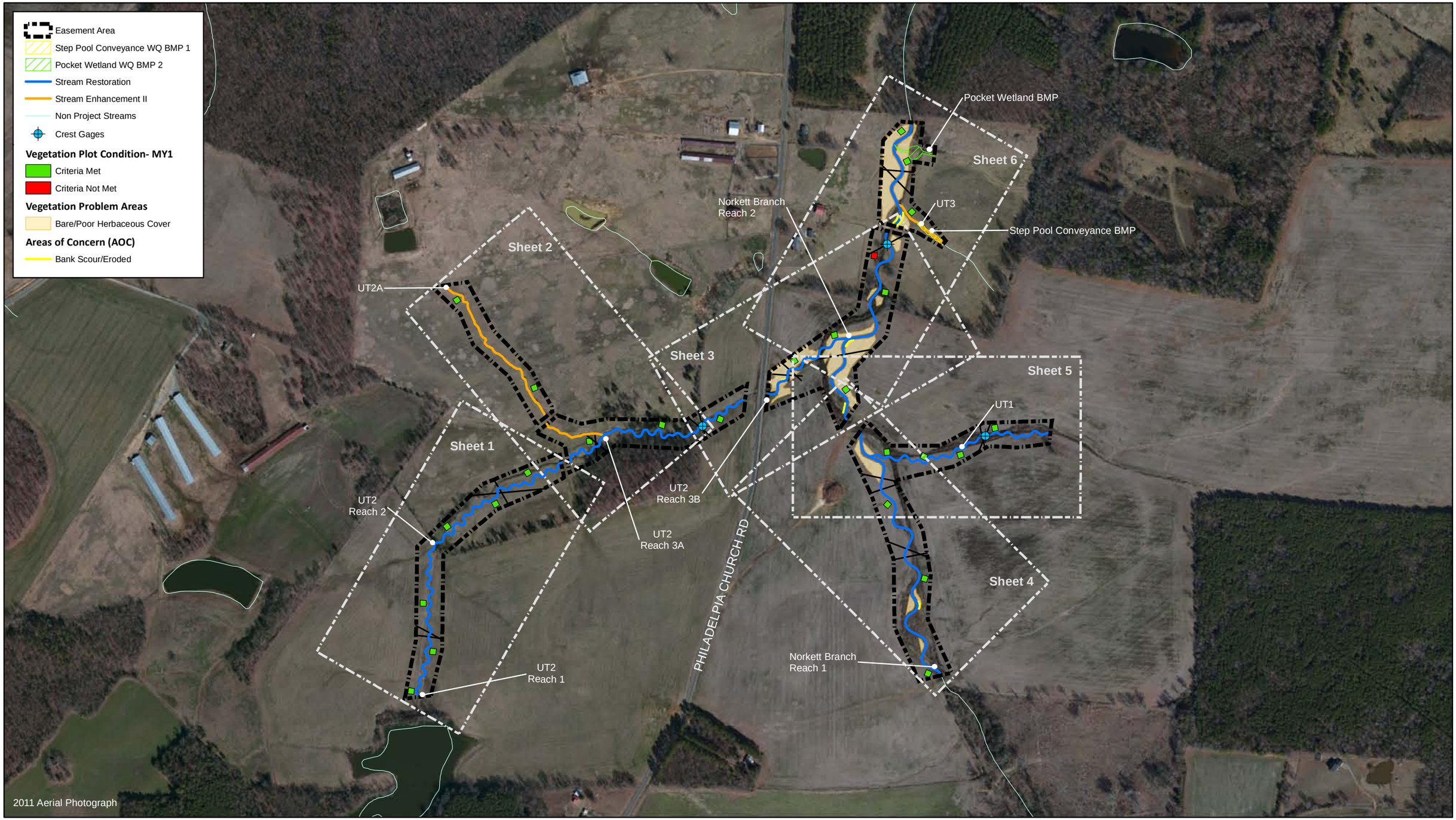
Table 4. Project Information and Attributes
Norkett Branch Stream Mitigation Site (NCEEP Project No.95360)
Monitoring Year 1

Project Information						
Project Name	Norkett Branch Stream Mitigation Site					
County	Union County					
Project Area (acres)	31.6					
Project Coordinates (latitude and longitude)	34°52'47.56"N, 80°22'9.19"W					
Project Watershed Summary Information						
Physiographic Province	Carolina Slate Belt of the Piedmont Physiographic Province					
River Basin	Yadkin					
USGS Hydrologic Unit 8-digit	03040105					
USGS Hydrologic Unit 14-digit	03040105081020					
DWQ Sub-basin	03-07-14					
Project Drainiage Area (acres)	2,034					
Project Drainage Area Percentage of Impervious Area	<1%					
CGIA Land Use Classification	43% forested, 29% managed herbaceous cover, 28% cultivated land					
Reach Summary Information						
Parameters	**Norkett Branch Reach 1**	**Norkett Branch Reach 2**	**UT1**	**UT2**	**UT2A**	**UT3**
Length of reach (linear feet) - Post-Restoration[1]	2,369	1,499	1,198	4,175	1,378	170
Drainage area (acres)	1490	2034	48	457	72	28
Drainage area (sqmi)	2.3	3.2	0.08	0.72	0.11	0.04
NCDWQ stream identification score	43.75	41.5	32.25	35.75	23;30.75	25.75
NCDWQ Water Quality Classification	WS-V					
Morphological Desription (stream type)	P	P	P	P	I	I
Evolutionary trend (Simon's Model) - Pre- Restoration	III	III/IV	II/III	II, IV	IV	II/ III
Underlying mapped soils	Floodplain Soil Types for Site					
	Badin channery silt loam		Badin channery silt clay loam		Cid channery silt loam	Secrest-Cid complex
Drainage class	well-drained		well-drained		well-drained with moderate shrink-swell potential	well-drained
Soil Hydric status	N		N		N	Y
Slope	2-8%		2-8%		1-5%	0-3%
FEMA classification	AE	AE	N/A	N/A	N/A	N/A
Native vegetation community	Piedmont Bottomland Forest					
Percent composition exotic invasive vegetation -Post-Restoration	0%					

Regulatory Considerations			
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**
Waters of the United States - Section 404	X	X	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	X	X	
Division of Land Quality (Dam Safety)	N/A	N/A	N/A
Endangered Species Act	X	X	Norkett Branch Mitigation Plan; Wildlands determined "no effect" on Union County listed endangered species.
Historic Preservation Act	X	X	No historic resources were found to be impacted (letter from SHPO dated 8/20/2012).
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	N/A	N/A	N/A
FEMA Floodplain Compliance	X	X	CLOMR Approved, LOMR in process
Essential Fisheries Habitat	N/A	N/A	N/A

1. Total stream length does not exclude easement crossings.

APPENDIX 2. Visual Assessment Data



WILDLANDS ENGINEERING

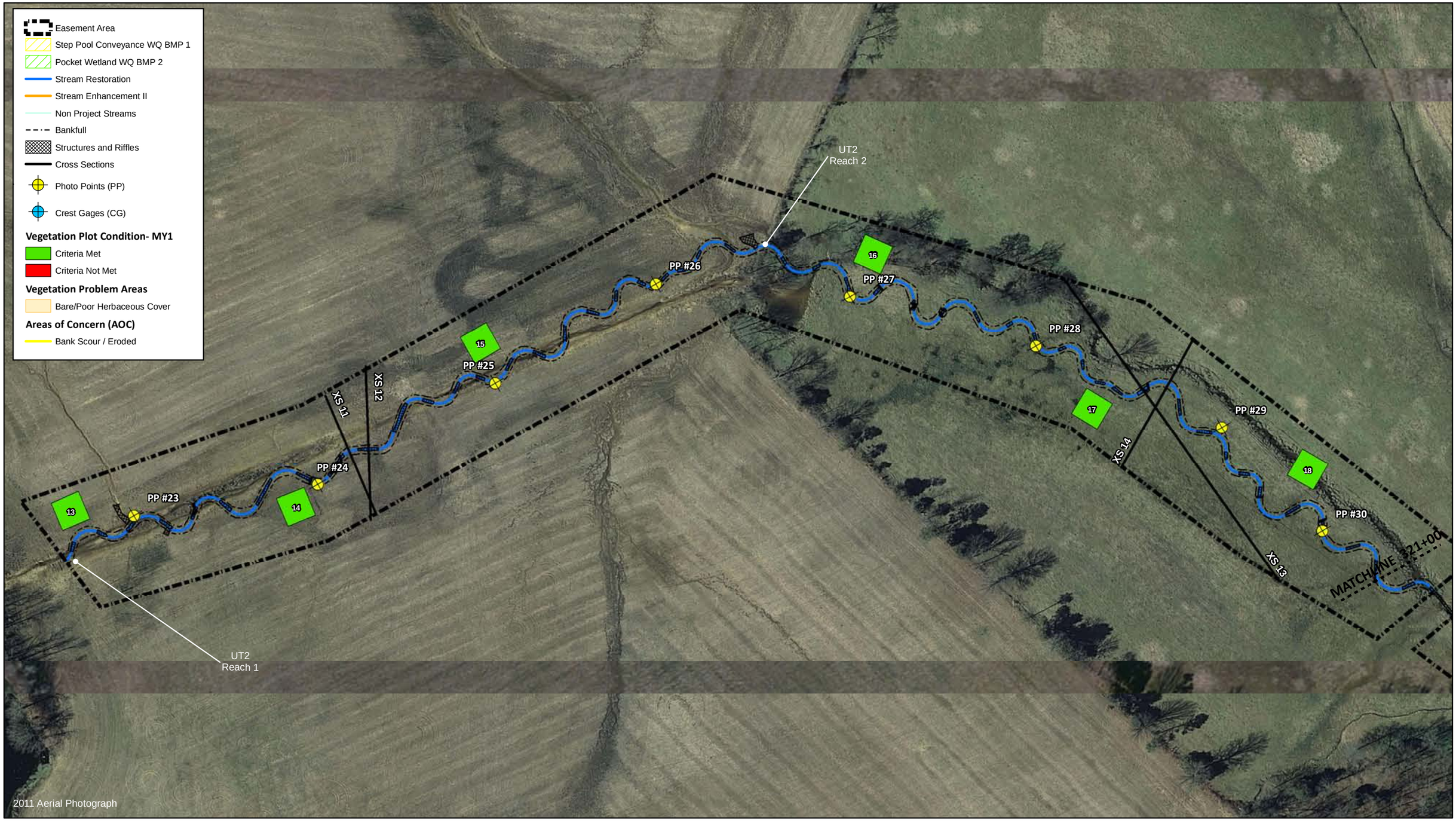
Ecosystem Enhancement Program

0 500 1,000 Feet

N

Figure 3.0 Integrated Current Condition Plan View Key
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1

Union County, NC



0 100 200 Feet

Figure 3.1 Integrated Current Condition Plan View Sheet 1 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC

0 100 200 Feet

Figure 3.2 Integrated Current Condition Plan View Sheet 2 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC

Easement Area
Step Pool Conveyance WQ BMP 1
Pocket Wetland WQ BMP 2
Stream Restoration
Stream Enhancement II
Non Project Streams
Bankfull
Structures and Riffles
Cross Sections
Photo Points (PP)
Crest Gages (CG)

Vegetation Plot Condition- MY1

Criteria Met
Criteria Not Met

Vegetation Problem Areas

Bare/Poor Herbaceous Cover

Areas of Concern (AOC)

Bank Scour / Eroded

UT2
Reach 3A

UT2
Reach 3B

Norkett Branch
Reach 2

Norkett Branch
Reach 1

MATCHLINE 331+50

MATCHLINE 342+00

MATCHLINE 130+50

MATCHLINE 119+50

XS 17
XS 18
XS 19
XS 20
XS 5
XS 6

PP #35
PP #36
PP #37
PP #38
PP #39
PP #10
PP #11
PP #12
PP #9
PP #8

CG #3
CG #1

AOC-1: Bare Bank
AOC-2: Bare Bank
AOC-3: Rill Erosion
AOC-4: Bare Bank
AOC-5: Bare Bank

20
21
22
7
6
5

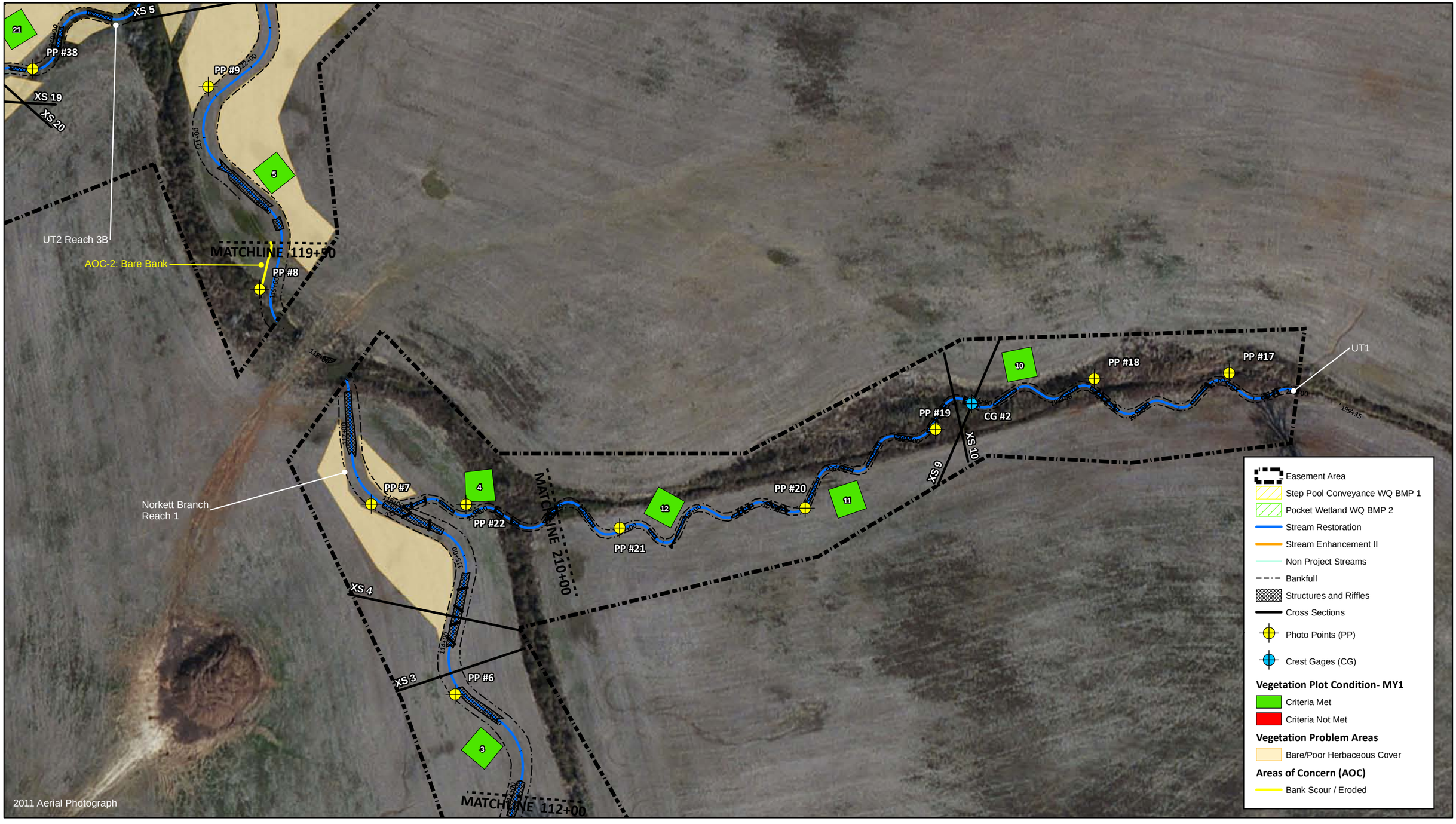
2011 Aerial Photograph

0 100 200 Feet

WILDLANDS ENGINEERING
Ecosystem Enhancement Program

Figure 3.3 Integrated Current Condition Plan View Sheet 3 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC

Figure 3.4 Integrated Current Condition Plan View Sheet 4 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC



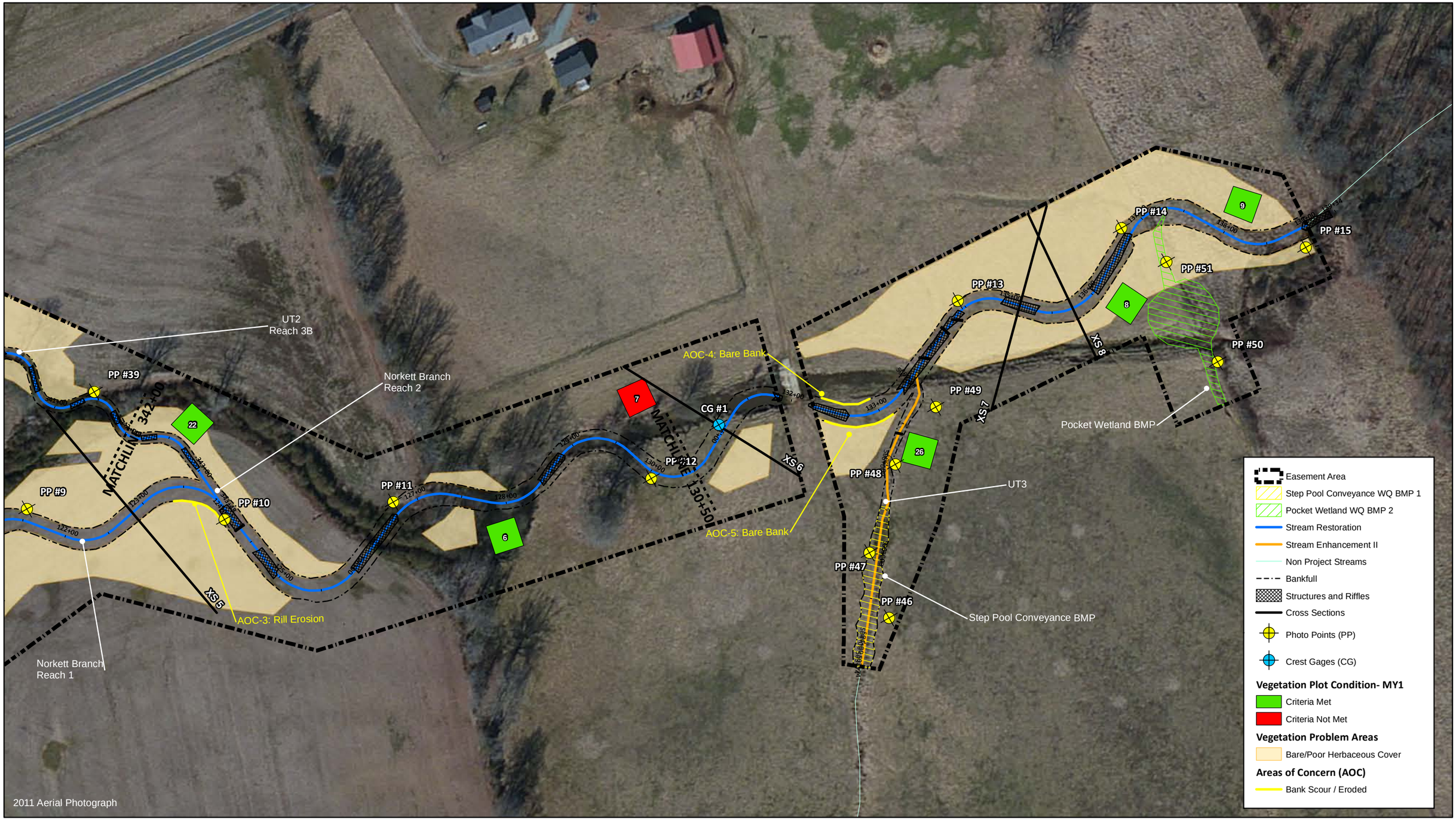
WILDLANDS ENGINEERING

Ecosystem Enhancement PROGRAM

0 100 200 Feet

N

Figure 3.5 Integrated Current Condition Plan View Sheet 5 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC



WILDLANDS ENGINEERING

Ecosystem Enhancement Program

0 100 200 Feet

Figure 3.6 Integrated Current Condition Plan View Sheet 6 of 6
Norkett Branch Stream Mitigation Site
NCEEP Project No.95360
Monitoring Year 1
Union County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	17	17			100%			
	3. Meander Pool Condition	Depth Sufficient	16	16			100%			
		Lenth Appropriate	16	16			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	17	17			100%			
		Thalweg centering at downstream of meander bend (Glide)	17	17			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			3	142	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	3	142	100%	100%	100%	100%
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5b. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 2
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	11	11			100%			
		Lenth Appropriate	11	11			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	12	12			100%			
		Thalweg centering at downstream of meander bend (Glide)	12	12			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	112	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	2	112	100%	100%	100%	100%
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	1	1			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5c. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT1
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	27	27			100%			
	3. Meander Pool Condition	Depth Sufficient	26	26			100%			
		Lenth Appropriate	27	27			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	27	27			100%			
		Thalweg centering at downstream of meander bend (Glide)	27	27			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	0	0	100%	100%	100%	100%
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	1	1			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5d. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 1
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	24	24			100%			
	3. Meander Pool Condition	Depth Sufficient	24	24			100%			
		Lenth Appropriate	24	24			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	25	25			100%			
		Thalweg centering at downstream of meander bend (Glide)	25	25			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	0	0	100%	100%	100%	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dilodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5e. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 2
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	31	31			100%			
	3. Meander Pool Condition	Depth Sufficient	31	31			100%			
		Lenth Appropriate	33	33			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	34	34			100%			
		Thalweg centering at downstream of meander bend (Glide)	34	34			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	0	0	100%	100%	100%	100%
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dilodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	4	4			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	4	4			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5f. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3A
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	25	25			100%			
	3. Meander Pool Condition	Depth Sufficient	24	24			100%			
		Lenth Appropriate	24	24			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	25	25			100%			
		Thalweg centering at downstream of meander bend (Glide)	25	25			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	0	0	100%	100%	100%	100%
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	1	1			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	1	1			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	1	1			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	1	1			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5g. Visual Stream Morphology Stability Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3B
Monitoring Year 1

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degredation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	10	10			100%			
	3. Meander Pool Condition	Depth Sufficient	10	10			100%			
		Lenth Appropriate	10	10			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	11	11			100%			
		Thalweg centering at downstream of meander bend (Glide)	11	11			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			1	21	100%	100%	100%	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	100%	100%	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	100%	100%	100%
				Totals	1	21	100%	100%	100%	100%
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dilodged boulders or logs.	2	2			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	2	2			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	2	2			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	2	2			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow.	2	2			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 6. Vegetation Condition Assessment Table
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Planted Acreage **29.9**

Vegetation Category	Definitions	Mapping Threshold (acres)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material	0.1	15	3.4	11%
Low Stem Density Areas[1]	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	1	0.0	0%
		Total	**16**	**3.4**	**11%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0	21	0.5	2%
		Cumulative Total	**16**	**3.4**	**13%**

Easement Acreage **31.6**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	1000	0	0.0	0%
Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	none	0	0	0%

[1] Acreage calculated from vegetation plots monitored for site.

Stream Photographs

	
Photo Point 1 – looking upstream (10/24/2014)	Photo Point 1 – looking downstream (10/24/2014)
	
Photo Point 2 – looking upstream (10/24/2014)	Photo Point 2 – looking downstream (10/24/2014)
	
Photo Point 3 – looking upstream (10/24/2014)	Photo Point 3 – looking downstream (10/24/2014)

	
Photo Point 4 – looking upstream (10/24/2014)	Photo Point 4 – looking downstream (10/24/2014)
	
Photo Point 5 – looking upstream (10/24/2014)	Photo Point 5 – looking downstream (10/24/2014)
	
Photo Point 6 – looking upstream (10/24/2014)	Photo Point 6 – looking downstream (10/24/2014)

	
Photo Point 7 – looking upstream (10/24/2014)	Photo Point 7 – looking downstream (10/24/2014)
	
Photo Point 8 – looking upstream (10/24/2014)	Photo Point 8 – looking downstream (10/24/2014)
	
Photo Point 9 – looking upstream (10/24/2014)	Photo Point 9 – looking downstream (10/24/2014)

	
Photo Point 10 – looking upstream (10/24/2014)	Photo Point 10 – looking downstream (10/24/2014)
	
Photo Point 11 – looking upstream (10/24/2014)	Photo Point 11 – looking downstream (10/24/2014)
	
Photo Point 12 – looking upstream (10/24/2014)	Photo Point 12 – looking downstream (10/24/2014)

	
Photo Point 13 – looking upstream (10/24/2014)	Photo Point 13 – looking downstream (10/24/2014)
	
Photo Point 14 – looking upstream (10/24/2014)	Photo Point 14 – looking downstream (10/24/2014)
	
Photo Point 15 – looking upstream (10/15/14)	Photo Point 15 – looking downstream (10/15/14)

	
Photo Point 16 – looking upstream (10/15/14)	Photo Point 16 – looking downstream (10/15/14)
	
Photo Point 17 – looking upstream (10/15/14)	Photo Point 17 – looking downstream (10/15/14)
	
Photo Point 18 – looking upstream (10/15/14)	Photo Point 18 – looking downstream (10/15/14)

	
Photo Point 19 – looking upstream (10/15/14)	Photo Point 19 – looking downstream (10/15/14)
	
Photo Point 20 – looking upstream (10/15/14)	Photo Point 20 – looking downstream (10/15/14)
	
Photo Point 21 – looking upstream (10/15/14)	Photo Point 21 – looking downstream (10/15/14)

	
Photo Point 22 – looking upstream (10/15/14)	Photo Point 22 – looking downstream (10/15/14)
	
Photo Point 23 – looking upstream (10/17/14)	Photo Point 23 – looking downstream (10/17/14)
	
Photo Point 24 – looking upstream (10/17/14)	Photo Point 24 – looking downstream (10/17/14)

	
Photo Point 25 – looking upstream (10/17/14)	Photo Point 25 – looking downstream (10/17/14)
	
Photo Point 26 – looking upstream (10/17/14)	Photo Point 26 – looking downstream (10/17/14)
	
Photo Point 27 – looking upstream (10/17/14)	Photo Point 27 – looking downstream (10/17/14)

	
Photo Point 28 – looking upstream (10/17/14)	Photo Point 28 – looking downstream (10/17/14)
	
Photo Point 29 – looking upstream (10/17/14)	Photo Point 29 – looking downstream (10/17/14)
	
Photo Point 30 – looking upstream (10/24/14)	Photo Point 30 – looking downstream (10/24/14)

	
Photo Point 31 – looking upstream (10/24/14)	Photo Point 31 – looking downstream (10/24/14)
	
Photo Point 32 – looking upstream (10/24/14)	Photo Point 32 – looking downstream (10/24/14)
	
Photo Point 33 – looking upstream (10/24/14)	Photo Point 33 – looking downstream (10/24/14)

	
Photo Point 34 – looking upstream (10/24/14)	Photo Point 34 – looking downstream (10/24/14)
	
Photo Point 35 – looking upstream (10/24/14)	Photo Point 35 – looking downstream (10/24/14)
	
Photo Point 36 – looking upstream (10/24/14)	Photo Point 36 – looking downstream (10/24/14)

	
Photo Point 37 – looking upstream (10/24/14)	Photo Point 37 – looking downstream (10/24/14)
	
Photo Point 38 – looking upstream (10/24/14)	Photo Point 38 – looking downstream (10/24/14)
	
Photo Point 39 – looking upstream (10/24/14)	Photo Point 39 – looking downstream (10/24/14)

	
Photo Point 40 – looking upstream (10/16/14)	Photo Point 40 – looking downstream (10/16/14)
	
Photo Point 41 – looking upstream (10/16/14)	Photo Point 41 – looking downstream (10/16/14)
	
Photo Point 42 – looking upstream (10/16/14)	Photo Point 42 – looking downstream (10/16/14)

	
Photo Point 43 – looking upstream (10/16/14)	Photo Point 43 – looking downstream (10/16/14)
	
Photo Point 44 – looking upstream (10/16/14)	Photo Point 44 – looking downstream (10/16/14)
	
Photo Point 45 – looking upstream (10/16/14)	Photo Point 45 – looking downstream (10/16/14)

	
Photo Point 46 – looking upstream (10/23/2014)	Photo Point 46 – looking downstream (10/23/2014)
	
Photo Point 47 – looking upstream (10/23/2014)	Photo Point 47 – looking downstream (10/23/2014)
	
Photo Point 48 – looking upstream (10/23/2014)	Photo Point 48 – looking downstream (10/23/2014)

	
Photo Point 49 – looking upstream (10/23/2014)	Photo Point 49 – looking downstream (10/23/2014)
	
Photo Point 50 – looking downstream at Pocket Wetland WQ BMP (10/23/2014)	Photo Point 51 – looking upstream at Pocket Wetland WQ BMP (10/23/2014)

Vegetation Photographs

	
Vegetation Plot 1 – (09/03/2014)	Vegetation Plot 2 – (09/03/2014)
	
Vegetation Plot 3 – (09/03/2014)	Vegetation Plot 4 – (09/03/2014)
	
Vegetation Plot 5 – (10/24/2014)	Vegetation Plot 6 – (09/03/2014)

	
Vegetation Plot 7 – (10/24/2014)	Vegetation Plot 8 – (09/03/2014)
	
Vegetation Plot 9 – (09/03/2014)	Vegetation Plot 10 – (09/03/2014)
	
Vegetation Plot 11 – (09/03/2014)	Vegetation Plot 12 – (09/03/2014)

Vegetation Plot 13 – (09/03/2014)

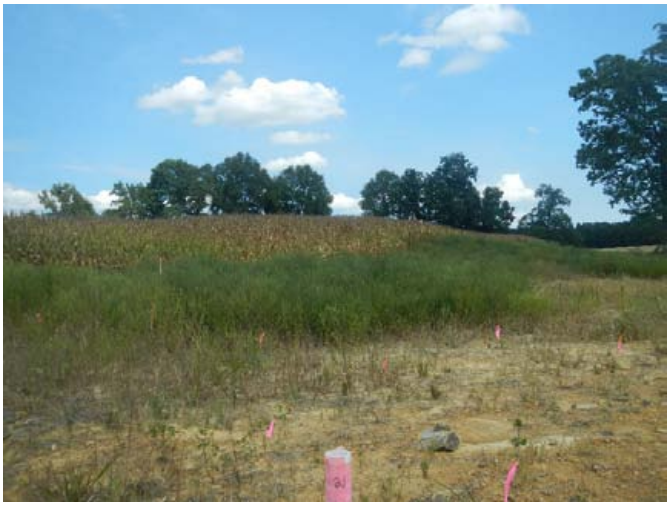
Vegetation Plot 14 – (09/03/2014)

Vegetation Plot 15 – (09/03/2014)

Vegetation Plot 16 – (09/03/2014)

Vegetation Plot 17 – (09/03/2014)

Vegetation Plot 18 – (09/03/2014)

	
Vegetation Plot 19 – (09/03/2014)	Vegetation Plot 20 – (09/03/2014)
	
Vegetation Plot 21 – (09/03/2014)	Vegetation Plot 22 – (09/03/2014)
	
Vegetation Plot 23 – (09/03/2014)	Vegetation Plot 24– (09/03/2014)

	
Vegetation Plot 25 – (09/03/2014)	Vegetation Plot 26 – (09/03/2014)

Stream Areas of Concern (AOC)

	
AOC-1: Bare bank on UT2 Reach 3B left bank, 12-1-2014	AOC-2: Bare bank on Norkett Branch Reach 1 left bank, 12-1-2014
	
AOC-3: Rill erosion Norkett Branch Reach 1 right bank, 12-1-2014	AOC-4; Bare bank Norkett Branch Reach 2 left bank, 12-1-2014
	
AOC-5: Bare bank Norkett Branch Reach 2 right bank, 12-1-2014	AOC-6: Loose mat Norkett Branch Reach 1 right bank, 12-1-2014

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Plot	MY1 Success Criteria Met (Y/N)	Tract Mean
1	Y	96%
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	N	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	
13	Y	
14	Y	
15	Y	
16	Y	
17	Y	
18	Y	
19	Y	
20	Y	
21	Y	
22	Y	
23	Y	
24	Y	
25	Y	
26	Y	

Table 8. CVS Vegetation Plot Metadata
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Report Prepared By	Alea Tuttle
Date Prepared	9/12/2014 17:11
database name	*Norkett MY1 cvs-eep-entrytool-v2.3.1.dbf*
database location	*Q:\ActiveProjects\005-02134 Norkett Branch FDP\Monitoring\Monitoring Year 1\Vegetation Assessment*
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	*This worksheet, which is a summary of the project and the project data.*
Plots	*List of plots surveyed.*
Stem Count by Plot and Spp	*Unknown*
PROJECT SUMMARY----------	
Project Code	95360
Project Name	Norkett Branch
Description	Norkett Branch Stream Mitigation Site
length (ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	26

Table 9. Planted and Total Stem Counts
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

			Current Plot Data (MY1 2014)																																		
			95360-WEI-0001			95360-WEI-0002			95360-WEI-0003			95360-WEI-0004			95360-WEI-0005			95360-WEI-0006			95360-WEI-0007			95360-WEI-0008			95360-WEI-0009			95360-WEI-0010			95360-WEI-0011			95360-WEI-0012		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	river birch	Tree	4	4	4	1	1	1	1	1	1				2	2	2				1	1	1	1	1	1				2	2	2	1	1	1	1	1	1
Celtis laevigata	sugarberry	Tree							1	1	1																											
Cercis canadensis	eastern redbud	Tree	2	2	2	3	3	3				1	1	1	2	2	2							1	1	1				1	1	1	2	2	2	1	1	1
Cornus florida	flowering dogwood	Tree				3	3	3	7	7	7	4	4	4	3	3	3	1	1	1	2	2	2	1	1	1	2	2	2	3	3	3	2	2	2			
Fraxinus pennsylvanica	green ash	Tree				4	4	4							1	1	1	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2			
Hamamelis virginiana	American witchhazel	Tree				1	1	1							1	1	1	1	1	1																		
Liriodendron tulipifera	tuliptree	Tree	1	1	1										1	1	1							1	1	1	2	2	2	3	3	3	1	1	1	1	1	1
Platanus occidentalis	American sycamore	Tree	2	2	2	1	1	1				4	4	4				1	1	1				4	4	4	4	4	4	1	1	1	1	1	1	1	1	1
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1				2	2	2							1	1	1	1	1	1	1	1	1									
Quercus phellos	willow oak	Tree				1	1	1				1	1	1	1	1	1	4	4	4				1	1	1	2	2	2	1	1	1				1	1	1
Quercus rubra	northern red oak	Tree	3	3	3				3	3	3													1	1	1	1	1	1							3	3	3
Sambucus canadensis	Common Elderberry	Shrub										2	2	2	2	2	2				1	1	1							1	1	1	2	2	2			
Stem count			13	13	13	15	15	15	12	12	12	14	14	14	13	13	13	10	10	10	7	7	7	14	14	14	15	15	15	15	15	15	11	11	11	8	8	8
size (ares)			1			1			1			1			1			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			6	6	6	8	8	8	4	4	4	6	6	6	8	8	8	5	5	5	5	5	5	9	9	9	7	7	7	8	8	8	7	7	7	6	6	6
Stems per ACRE			526	526	526	607	607	607	486	486	486	567	567	567	526	526	526	405	405	405	283	283	283	567	567	567	607	607	607	607	607	607	445	445	445	324	324	324

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Table 9. Planted and Total Stem Counts
Norkett Branch Stream Mitigation Site (NCEEP Project No. 9536
Monitoring Year 1

			Current Plot Data (MY1 2014)																																		
			95360-WEI-0013			95360-WEI-0014			95360-WEI-0015			95360-WEI-0016			95360-WEI-0017			95360-WEI-0018			95360-WEI-0019			95360-WEI-0020			95360-WEI-0021			95360-WEI-0022			95360-WEI-0023			95360-WEI-0024		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Betula nigra	river birch	Tree	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1
Celtis laevigata	sugarberry	Tree																																				
Cercis canadensis	eastern redbud	Tree	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							1	1	1	4	4	4				1	1	1			
Cornus florida	flowering dogwood	Tree	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2				1	1	1				1	1	1	3	3	3	2	2	2	2	2	2
Fraxinus pennsylvanica	green ash	Tree	2	2	2	3	3	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3				5	5	5	3	3	3	3	3	3
Hamamelis virginiana	American witchhazel	Tree																									3	3	3									
Liriodendron tulipifera	tuliptree	Tree	1	1	1	1	1	1													2	2	2	2	2	2	2	2	2	1	1	1	2	2	2	1	1	1
Platanus occidentalis	American sycamore	Tree	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	1	1	2	2	2	4	4	4	4	4	4
Quercus michauxii	swamp chestnut oak	Tree	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							1	1	1	1	1	1
Quercus phellos	willow oak	Tree	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Quercus rubra	northern red oak	Tree	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				1	1	1	1	1	1
Sambucus canadensis	Common Elderberry	Shrub																												1	1	2						
Stem count			14	14	14	13	13	13	14	14	14	14	14	14	15	15	15	12	12	12	14	14	14	14	14	14	13	13	13	14	14	15	17	17	17	15	15	15
size (ares)			1			1			1			1			1			1			1			1			1			1			1			1		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
Species count			9	9	9	7	7	7	8	8	8	8	8	8	8	8	8	6	6	6	8	8	8	8	8	8	7	7	7	7	7	7	9	9	9	8	8	8
Stems per ACRE			567	567	567	526	526	526	567	567	567	567	567	567	607	607	607	486	486	486	567	567	567	567	567	567	526	526	526	567	567	607	688	688	688	607	607	607

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

Table 9. Planted and Total Stem Counts
Norkett Branch Stream Mitigation Site (NCEEP Project No. 9536
Monitoring Year 1

			Current Plot Data (MY1 2014)						Annual Summary					
			95360-WEI-0025			95360-WEI-0026			MY1 (2014)			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Betula nigra	river birch	Tree	1	1	1				25	25	25	32	32	32
Celtis laevigata	sugarberry	Tree							1	1	1	7	7	7
Cercis canadensis	eastern redbud	Tree	1	1	1				25	25	25	42	42	42
Cornus florida	flowering dogwood	Tree	1	1	1	3	3	3	48	48	48	75	75	75
Fraxinus pennsylvanica	green ash	Tree	3	3	3	4	4	4	63	63	63	67	67	67
Hamamelis virginiana	American witchhazel	Tree				1	1	1	7	7	7	8	8	8
Liriodendron tulipifera	tuliptree	Tree	1	1	1	1	1	1	24	24	24	59	59	59
Platanus occidentalis	American sycamore	Tree	4	4	4	1	1	1	66	66	66	57	57	57
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1	18	18	18	36	36	36
Quercus phellos	willow oak	Tree	1	1	1	2	2	2	34	34	34	27	27	27
Quercus rubra	northern red oak	Tree	1	1	1	1	1	1	24	24	24	24	24	24
Sambucus canadensis	Common Elderberry	Shrub				1	1	1	10	10	11	13	13	13
Stem count			14	14	14	15	15	15	345	345	346	447	447	447
size (ares)			1			1			26			26		
size (ACRES)			0.02			0.02			0.64			0.64		
Species count			9	9	9	9	9	9	12	12	12	12	12	12
Stems per ACRE			567	567	567	607	607	607	537	537	539	696	696	696

Color for Density

Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

APPENDIX 4. Morphological Summary Data and Plots

Table 10a. Baseline Stream Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Norkett Branch Reaches 1 and 2

Parameter	Gage	Pre-Restoration Condition				Reference Reaches						Design				As-Built/Baseline			
		Norkett Branch Reach 1		Norkett Branch Reach 2		Spencer Creek		UT to Spencer Creek		UT Richland Creek Reach 2		Norkett Branch Reach 1		Norkett Branch Reach 2		Norkett Branch Reach 1		Norkett Branch Reach 2	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																			
Bankfull Width (ft)	n/a	12.8	21.5	22	29.5	10.7	11.2	7.0		13.3	15.2	22.0		23.0		22.5	26.6	25.6	25.7
Floodprone Width (ft)		35	58	72	85	60.0	114+	>81		>50		48.4	>110	60.5	>115	>200	>200	>200	>200
Bankfull Mean Depth		1.7	1.8	1.4	2.4	1.6	1.8	2.0		1.1	1.3	1.8		1.9		1.6	1.8	1.8	2.0
Bankfull Max Depth		3.1	3.2	2.3	2.9	2.1	2.6	1.1		1.8	2.1	2.75		2.75		2.6	3.3	3.0	3.3
Bankfull Cross-sectional Area (ft^2)		28.1	35.6	40.6	52.8	17.8	19.7	7.7		16.5	17.5	40.6		43.2		38.8	44.6	46.7	50.8
Width/Depth Ratio		5.9	13	9.2	21.4	5.8	7.1	6.4		10.1	13.9	11.9		12.2		13.1	16.7	13.0	14.1
Entrenchment Ratio		2.1	4.5	2.9	3.3	5.5	10.2	>11.6		>2.5		2.2	>5	2.2	>5	>2.2		>2.2	
Bank Height Ratio		1.0	1.4	1.3	1.6	1.0		1.0		1.0		1.0		1.0		1.0		1.0	
D50 (mm)		8.6		0.4								---		---		18.4	59.6	7.3	9.9
Profile																			
Riffle Length (ft)	n/a					---		---		---		---		---		14	84	19	111
Riffle Slope (ft/ft)		0.0036	0.0039	0.0032	0.0120	0.0130		0.0140		0.0183	0.0355	0.0018	0.0120	0.0023	0.0180	0.0000	0.0152	0.0009	0.0163
Pool Length (ft)						---		---		---		---		---		12	88	51	102
Pool Max Depth (ft)		4.0	4.0	2.9	4.0	3.3		2.5		1.8		2.8	7.8	2.8	7.9	3.3	5.1	3.5	4.8
Pool Spacing (ft)^		62	300	60	300	71.0		19	42	33.0	93.0	29	163	30	170	67	183	98	172
Pool Volume (ft^3)																			
Pattern																			
Channel Beltwidth (ft)	n/a	N/A		N/A		38	41	11	27	N/A		35	161	37	168	38	147	38	155
Radius of Curvature (ft)		N/A		N/A		11	15	6	16	N/A		40	66	41	69	38	65	40	64
Rc:Bankfull Width (ft/ft)		N/A		N/A		1.0	1.3	0.8	2.3	N/A		1.8	3	1.8	3	1.7	2.4	1.6	2.5
Meander Length (ft)		N/A		N/A		46	48	37.7	43	N/A		66	264	69	276	167	263	181	277
Meander Width Ratio		N/A		N/A		3.6	3.7	1.6	3.8	N/A		1.6	7.3	1.6	7.3	1.7	5.5	1.5	6.0
Substrate, Bed and Transport Parameters																			
Ri%/Ru%/P%/G%/S%	n/a																		
SC%/Sa%/G%/C%/B%/Be%																			
d16/d35/d50/d84/d95/d100		SC/4.6/8.7/28.5/64/2048		SC/SC/0.4/21.1/>2048/>2048		---		---		---						0.4/3.6/7.4/52.3/139.4/362		2.6/6.7/13.0/62.6/210.9/>2048	
Reach Shear Stress (Competency) lb/ft^2		0.41	0.44	0.17	0.38							0.28		0.4		0.27	0.29	0.30	0.32
Max part size (mm) mobilized at bankfull												15-25		20-35		15-25		20-35	
Stream Power (Capacity) W/m^2																			
Additional Reach Parameters																			
Drainage Area (SM)	n/a	2.3		3.2		0.96		0.01		0.28		2.3		3.2		2.3		3.2	
Watershed Impervious Cover Estimate (%)		<1% [1]		<1% [1]		---		---		---		<1% [1]		<1% [1]		<1% [1]		<1% [1]	
Rosgen Classification		E4		C/E5		E4		E5		C4/E4		C4		C5		C4		C4/E4	
Bankfull Velocity (fps)		3.5	4	2.5	3.5	4.9	5.4	3.2		3.5	4.1	2.8		3.3		2.6	2.8	2.8	2.9
Bankfull Discharge (cfs)		110		140		97		25		29.1	32.0	110		140		105	124	130	148
Q-NFF regression																			
Q-USGS extrapolation																			
Q-Mannings																			
Valley Length (ft)		---		---		---		---		---		1910		1249		1910		1249	
Channel Thalweg Length (ft)[2]		1,980		1,505		---		---		---		2,369		1,499		2,369		1,499	
Sinuosity (ft)[3]		1.1		1.1		2.30		2.50		1.00		1.24		1.20		1.24		1.20	
Water Surface Slope (ft/ft)[2]		0.004		0.001	0.005	---		---		---		0.0025		0.0036		0.003		0.003	
Bankfull Slope (ft/ft)						---		---		---		---		---		0.003		0.003	

[1] No impervious land use is present within the project watershed per the CGIA Land Use Classification data set.

[2] Channel Length represented does not include easement breaks.

(---): Data was not provided

N/A: Not Applicable

SC: Silt/Clay

Table 10b. Baseline Stream Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

UT1 and UT2 Reaches 1 and 2

Parameter	Gage	Pre-Restoration Condition						Reference Reaches	Design						As Built/ Baseline					
		UT1		UT2 Reach 1		UT2 Reach 2			UT1		UT2 Reach 1		UT2 Reach 2		UT1		UT2 Reach 1		UT2 Reach 2	
		Min	Max	Min	Max	Min	Max	Min	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle																				
Bankfull Width (ft)	n/a	2.9	8.2	13.6		7.1		See Table 5a	7.5		8.0		8.0		10.5		9.4		9.0	9.6
Floodprone Width (ft)		6	40	29		53			16.5	>38	>40		>40		136		144		>200	>200
Bankfull Mean Depth		0.9	1	0.6		0.7			0.6		0.6		0.7		0.4		0.5		0.5	0.6
Bankfull Max Depth		1.2	2	1		1.5			0.9		0.9		1.0		0.8		1.2		1.1	1.2
Bankfull Cross-sectional Area (ft^2)		2.6	8.6	7.9		5.1			4.6		4.6		5.3		4.5		4.5		5.2	5.3
Width/Depth Ratio		2.6	8.6	23.4		9.8			12.2		13.9		12.1		24.5		19.8		15.3	17.6
Entrenchment Ratio		2.2	4.9	>7		>8			2.2	>5	>5		>5		>2.2		>2.2		>2.2	
Bank Height Ratio		1.5	2.4	1		1	1.7		1.0		1.0		1.0		1.0		1.0		1.0	
D50 (mm)		SC		7.3		7.3									20.9		19.5		20.1	27.4
Profile																				
Riffle Length (ft)	n/a							See Table 5a	---		---		---		7	39	7	34	6	27
Riffle Slope (ft/ft)		0.017	0.054	0.009	0.032	0.006			0.013	0.045	0.01	0.032	0.013	0.028	0.007	0.044	0.006	0.037	0.009	0.039
Pool Length (ft)									---		---		---		12	69	11	35	11	45
Pool Max Depth (ft)		1.4	1.7	1.3		2.5			0.9	2.6	0.9	2.4	1.0	2.8	1.2	2.5	1.5	2.6	1.5	2.5
Pool Spacing (ft)^		61	295	190		51	130		10	56	10	56	10	56	30	58	21	64	22	71
Pool Volume (ft^3)																				
Pattern																				
Channel Beltwidth (ft)	n/a	N/A		N/A	N/A	26.9	49.5	See Table 5a	12	55	13	44	13	44	13	49	10	42	12	52
Radius of Curvature (ft)		N/A		N/A	N/A	6.92	33.39		12	23	13.0	24.0	13	24	14	23	15	21	14	22
Rc:Bankfull Width (ft/ft)		N/A		N/A	N/A	0.98	4.73		1.6	3	1.6	3.0	1.6	3	1.3	2.2	1.6	2.2	1.6	2.3
Meander Length (ft)		N/A		N/A	N/A	83.5	141.4		23	90	24.0	96.0	24	96	61	88	45	92	44	83
Meander Width Ratio		N/A		N/A	N/A	3.8	7.01		1.6	7.3	1.6	5.5	1.6	5.5	1.2	4.7	1.0	4.4	1.3	5.4
Substrate, Bed and Transport Parameters																				
Ri%/Ru%/P%/G%/S%	n/a																			
SC%/Sa%/G%/C%/B%/Be%																				
d16/d35/d50/d84/d95/d100		SC/SC/SC/SC/0.77/9.38/>2048		SC/SC/7.3/47.7/85.7/>2048		SC/SC/7.3/47.7/85.7/>2048		See Table 5a							SC/1.0/12.7/55.3/90/256		SC/7.1/12.2/28.5/42.9/90		2.4/11.6/20.7/56.1/86.7/180	
Reach Shear Stress (Competency) lb/ft^2		0.57	0.82	0.14		0.42			0.38		0.18		0.27		0.27		0.16		0.21	0.23
Max part size (mm) mobilized at bankfull									20-35		10-20		15-25		15-25		10-20		15-25	
Stream Power (Capacity) W/m^2																				
Additional Reach Parameters																				
Drainage Area (SM)	n/a	0.08		0.40		0.48		See Table 5a	0.08		0.15		0.22		0.08		0.15		0.22	
Watershed Impervious Cover Estimate (%)		<1% [1]		<1% [1]		<1% [1]			<1% [1]		<1% [1]		<1% [1]		<1% [1]		<1% [1]		<1% [1]	
Rosgen Classification		E6		C/E4		E4			C/E6		C/E4		C/E4		C4		C4		C4	
Bankfull Velocity (fps)		3.3	4.2	1.4		3.4			2.6		2.4		3.2		2.1		1.6		1.9	2.0
Bankfull Discharge (cfs)		12		11		17			12		11		17		10		7		10	11
Q-NFF regression																				
Q-USGS extrapolation																				
Q-Mannings																				
Valley Length (ft)		840		820		1156		See Table 5a	998		866		1108		998		866		1108	
Channel Thalweg Length (ft)[2]		840		820		1,272			1,198		1,039		1,440		1,198		1,039		1,440	
Sinuosity (ft)[3]		1.0		1.0		1.1			1.20		1.20		1.30		1.20		1.20		1.30	
Water Surface Slope ($ft/ft)^2$		0.15		0.004		0.012			0.010		0.005		0.007		0.011		0.006		0.007	
Bankfull Slope (ft/ft)									---		---		---		0.011		0.006		0.007	

[1] No impervious land use is present within the project watershed per the CGIA Land Use Classification data set.

[2] Channel Length represented does not include easement breaks.

(---): Data was not provided

N/A: Not Applicable

SC: Silt/Clay

Table 10c. Baseline Stream Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

UT2 Reaches 3A and 3B

Parameter	Gage	Pre-restoration Condition		Reference Reaches		Design				As Built/Baseline			
		UT2 Reach 3				UT2 Reach 3A		UT2 Reach 3B		UT2 Reach 3A		UT2 Reach 3B	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle													
Bankfull Width (ft)	n/a	7.5		See Table 5a		9.0		11.0		10.5		13.9	
Floodprone Width (ft)		24				45+		55+		>200		130	
Bankfull Mean Depth		1.1				0.8		1.0		0.7		0.8	
Bankfull Max Depth		1.6				1.2		1.5		1.2		1.6	
Bankfull Cross-sectional Area (ft^2)		8.3				6.9		10.8		7.2		11.8	
Width/Depth Ratio		6.7				11.7		11.2		15.3		16.5	
Entrenchment Ratio		3.2				5.0+		5.0+		>2.2		>2.2	
Bank Height Ratio		1.3	1.8			1.0		1.0		1.0		1.0	
D50 (mm)		7.32								32.0		33.4	
Profile													
Riffle Length (ft)	n/a			See Table 5a		---		---		8	25	13	28
Riffle Slope (ft/ft)		0.014	0.025			0.011	0.032	0.008	0.017	0.010	0.046	0.001	0.024
Pool Length (ft)						---		---		10	42	32	45
Pool Max Depth (ft)		2				1.20	3.20	1.50	4.10	1.77	2.98	2.45	3.32
Pool Spacing (ft)^		26	53			12	63	14	77	26	66	38	72
Pool Volume (ft^3)													
Pattern													
Channel Beltwidth (ft)	n/a	N/A	N/A	See Table 5a		14	50	18	61	8	37	20	61
Radius of Curvature (ft)		15	63.4			14	27	20	33	14	27	24	31
Rc:Bankfull Width (ft/ft)		2	8.45			1.6	3.0	1.8	3.0	1.3	2.6	1.7	2.2
Meander Length (ft)		N/A	N/A			27	108	33	132	58	88	87	105
Meander Width Ratio		N/A	N/A			1.6	5.5	1.6	5.5	0.8	3.5	1.4	4.4
Substrate, Bed and Transport Parameters													
Ri%/Ru%/P%/G%/S%	n/a												
SC%/Sa%/G%/C%/B%/Be%													
d16/d35/d50/d84/d95/d100		SC/SC/7.3/47.7/85.7/>2048		See Table 5a						22.6/27.4/32/53.7/69.7/128		SC/4.9/13.3/67.2/89.9/128	
Reach Shear Stress (Competency) lb/ft^2						0.29		0.23		0.23		0.14	
Max part size (mm) mobilized at bankfull						15	25	12	20	17		10	
Stream Power (Capacity) W/m^2													
Additional Reach Parameters													
Drainage Area (SM)	n/a	0.71		See Table 5a		0.46		0.46		0.46		0.46	
Watershed Impervious Cover Estimate (%)		<1% [1]				<1% [1]		<1% [1]		<1% [1]		<1% [1]	
Rosgen Classification		E4				C/E4		C/E4		E4		C4	
Bankfull Velocity (fps)		3.7				3.7		3.0		2.1		1.7	
Bankfull Discharge (cfs)		26	33			26		33		15		20	
Q-NFF regression													
Q-USGS extrapolation													
Q-Mannings													
Valley Length (ft)		1184		See Table 5a		830		548		830		548	
Channel Thalweg Length (ft)[2]		1,303				1,038		658		1,038		658	
Sinuosity (ft)[3]		1.1				1.25		1.20		1.25		1.20	
Water Surface Slope (ft/ft)[2]		0.009				0.006		0.004		0.006		0.003	
Bankfull Slope (ft/ft)						---		---		0.007		0.002	

[1] No impervious land use is present within the project watershed per the CGIA Land Use Classification data set.

[2] Channel Length represented does not include easement breaks.

(---): Data was not provided

N/A: Not Applicable

SC: Silt/Clay

Table 11a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Norkett Branch Reach 1 and 2

	Cross-Section 1 (Pool)						Cross-Section 2 (Riffle)						Cross-Section 3 (Pool)						Cross-Section 4 (Riffle)					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	33.2	34.1					26.6	23.2					26.7	29.2					25.1	23.1				
Floodprone Width (ft)	N/A	N/A					>200	>200					N/A	N/A					>200	>200				
Bankfull Mean Depth (ft)	1.8	2.0					1.6	2.0					2.3	2.3					1.8	2.1				
Bankfull Max Depth (ft)	3.6	3.7					2.9	3.0					3.9	4.4					3.3	3.4				
Bankfull Cross-Sectional Area (ft^2)	58.4	68.3					42.6	45.5					60.3	67.5					44.6	47.7				
Bankfull Width/Depth Ratio	18.9	17.1					16.7	11.9					11.8	12.7					14.1	11.1				
Bankfull Entrenchment Ratio	N/A	N/A					>7.5	>12					N/A	N/A					>8	>9				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				
	Cross-Section 5 (riffle)						**Cross-Section 6 (Riffle)**						**Cross-Section 7 (Riffle)**						**Cross-Section 8 (Pool)**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	22.5	23.5					25.7	26.0					25.6	24.9					30.1	26.8				
Floodprone Width (ft)	>200	>200					>200	>200					>200	>200					N/A	N/A				
Bankfull Mean Depth (ft)	1.7	1.8					2.0	2.0					1.8	2.0					2.4	2.7				
Bankfull Max Depth (ft)	2.6	3.0					3.3	3.3					3.0	3.2					4.5	4.4				
Bankfull Cross-Sectional Area (ft^2)	38.8	42.3					50.8	52.0					46.7	48.7					72.5	71.0				
Bankfull Width/Depth Ratio	13.1	13.1					13.0	13.0					14.1	12.7					12.5	10.1				
Bankfull Entrenchment Ratio	>9	>9					>8	>8					>8	>8					N/A	N/A				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				
N/A: Not Applicable																								

Table 11b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

UT1 and UT2 Reaches 1 and 2

	Cross-Section 9 (Riffle)						Cross-Section 10 (Pool)						Cross-Section 11 (Pool)						Cross-Section 12 (Riffle)					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	10.5	11.6					18.1	15.9					10.6	11.1					9.4	11.1				
Floodprone Width (ft)	136	136					N/A	N/A					N/A	N/A					144	151				
Bankfull Mean Depth (ft)	0.4	0.5					0.5	0.9					0.7	0.8					0.5	0.5				
Bankfull Max Depth (ft)	0.8	1.1					1.8	2.0					1.9	2.0					1.2	1.1				
Bankfull Cross-Sectional Area (ft^2)	4.5	6.2					9.8	14.0					7.5	9.4					4.5	5.6				
Bankfull Width/Depth Ratio	24.5	21.7					33.3	18.0					15.2	13.2					19.8	22.0				
Bankfull Entrenchment Ratio	13.0	11.7					N/A	N/A					N/A	N/A					15.2	13.6				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				
	Cross-Section 13 (Riffle)						**Cross-Section 14 (Pool)**						**Cross-Section 15 (Riffle)**						**Cross-Section 16 (Pool)**					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	9.0	9.5					13.9	13.7					9.6	10.5					9.6	9.4				
Floodprone Width (ft)	>200	>200					N/A	N/A					>200	>200					N/A	N/A				
Bankfull Mean Depth (ft)	0.6	0.7					0.8	1.0					0.5	0.7					0.7	0.9				
Bankfull Max Depth (ft)	1.2	1.2					2.1	2.2					1.1	1.4					1.8	1.9				
Bankfull Cross-Sectional Area (ft^2)	5.3	7.1					11.7	14.1					5.2	7.6					7.0	8.1				
Bankfull Width/Depth Ratio	15.3	12.8					16.4	13.2					17.6	14.5					13.3	10.9				
Bankfull Entrenchment Ratio	>22	>21					N/A	N/A					>15	>19					N/A	N/A				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				

N/A: Not Applicable

Table 11c. Morphology and Hydraulic Summary (Dimensional Parameters - Cross-Section)
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

UT2 Reaches 3A and 3B

	Cross-Section 17 (Pool)						Cross-Section 18 (Riffle)						Cross-Section 19 (Riffle)						Cross-Section 20 (Pool)					
Dimension	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**
based on fixed bankfull elevation																								
Bankfull Width (ft)	10.5	10.9					10.5	11.1					13.9	12.6					14.7	15.0				
Floodprone Width (ft)	N/A	N/A					>200	>200					130	130					N/A	N/A				
Bankfull Mean Depth (ft)	1.0	1.2					0.7	0.7					0.8	1.2					1.4	1.5				
Bankfull Max Depth (ft)	2.0	2.0					1.2	1.3					1.6	1.8					2.6	2.7				
Bankfull Cross-Sectional Area (ft^2)	10.7	12.9					7.2	7.6					11.8	14.9					21.2	22.7				
Bankfull Width/Depth Ratio	10.2	9.2					15.3	16.2					16.5	10.6					10.2	9.9				
Bankfull Entrenchment Ratio	N/A	N/A					>19	>18					9.3	10.3					N/A	N/A				
Bankfull Bank Height Ratio	1.0	1.0					1.0	1.0					1.0	1.0					1.0	1.0				
N/A: Not Applicable																								

Table 12a. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	22.5	26.6	23.1	23.5								
Floodprone Width (ft)	>200	>200	>200	>200								
Bankfull Mean Depth	1.6	1.8	1.8	2.1								
Bankfull Max Depth	2.6	3.3	3.0	3.4								
Bankfull Cross-sectional Area (ft^2)	38.8	44.6	42.3	47.7								
Width/Depth Ratio	13.1	16.7	11.1	13.1								
Entrenchment Ratio	>2.2		>2.2									
Bank Height Ratio	1.0		1.0									
D50 (mm)	18.4	59.6	13.3	26.9								
Profile												
Riffle Length (ft)	14	84										
Riffle Slope (ft/ft)	0.0000	0.0152										
Pool Length (ft)	12	88										
Pool Max Depth (ft)	3.3	5.1										
Pool Spacing (ft)	67	183										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	38	147										
Radius of Curvature (ft)	38	65										
Rc:Bankfull Width (ft/ft)	1.7	2.4										
Meander Wave Length (ft)	167	263										
Meander Width Ratio	1.7	5.5										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	2,369											
Sinuosity (ft)	1.24											
Water Surface Slope (ft/ft)	0.003											
Bankfull Slope (ft/ft)	0.003											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	0.4/3.6/7.4/52.3/139.4/362		1.0/8.0/16.7/50.6/90/1024									
% of Reach with Eroding Banks			6%									

Table 12b. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 2
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	25.6	25.7	24.9	26.0								
Floodprone Width (ft)	>200	>200	>200	>200								
Bankfull Mean Depth	1.8	2.0	2.0	2.0								
Bankfull Max Depth	3.0	3.3	3.2	3.3								
Bankfull Cross-sectional Area (ft^2)	46.7	50.8	48.7	52.0								
Width/Depth Ratio	13.0	14.1	12.7	13.0								
Entrenchment Ratio	>2.2		>2.2									
Bank Height Ratio	1.0		1.0									
D50 (mm)	7.3	9.9	3.6	12.1								
Profile												
Riffle Length (ft)	19	111										
Riffle Slope (ft/ft)	0.0009	0.0163										
Pool Length (ft)	51	102										
Pool Max Depth (ft)	3.5	4.8										
Pool Spacing (ft)	98	172										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	38	155										
Radius of Curvature (ft)	40	64										
Rc:Bankfull Width (ft/ft)	1.6	2.5										
Meander Wave Length (ft)	181	277										
Meander Width Ratio	1.5	6.0										
Additional Reach Parameters												
Rosgen Classification	C4/E4		C4/E4									
Channel Thalweg Length (ft)	1,499											
Sinuosity (ft)	1.20											
Water Surface Slope (ft/ft)	0.003											
Bankfull Slope (ft/ft)	0.003											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	2.6/6.7/13.0/62.6/210.9/>2048		0.3/10.4/15.3/49.1/90/362									
% of Reach with Eroding Banks			7%									

Table 12c. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT1
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	10.5		11.6									
Floodprone Width (ft)	136		136									
Bankfull Mean Depth	0.4		0.5									
Bankfull Max Depth	0.8		1.1									
Bankfull Cross-sectional Area (ft^2)	4.5		6.2									
Width/Depth Ratio	24.5		21.7									
Entrenchment Ratio	13.0		11.7									
Bank Height Ratio	1.0		1.0									
D50 (mm)	20.9		48.3									
Profile												
Riffle Length (ft)	7	39										
Riffle Slope (ft/ft)	0.007	0.044										
Pool Length (ft)	12	69										
Pool Max Depth (ft)	1.2	2.5										
Pool Spacing (ft)	30	58										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	13	49										
Radius of Curvature (ft)	14	23										
Rc:Bankfull Width (ft/ft)	1.3	2.2										
Meander Wave Length (ft)	61	88										
Meander Width Ratio	1.2	4.7										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	1,198											
Sinuosity (ft)	1.20											
Water Surface Slope (ft/ft)	0.011											
Bankfull Slope (ft/ft)	0.011											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/1.0/12.7/55.3/90/256		SC/2.4/9.4/61.2/139.4/256.0									
% of Reach with Eroding Banks			0%									

Table 12d. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 1
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	9.4		11.1									
Floodprone Width (ft)	144		151									
Bankfull Mean Depth	0.5		0.5									
Bankfull Max Depth	1.2		1.1									
Bankfull Cross-sectional Area (ft^2)	4.5		5.6									
Width/Depth Ratio	19.8		22.0									
Entrenchment Ratio	15.2		13.6									
Bank Height Ratio	1.0		1.0									
D50 (mm)	19.5		32.0									
Profile												
Riffle Length (ft)	7	34										
Riffle Slope (ft/ft)	0.006	0.037										
Pool Length (ft)	11	35										
Pool Max Depth (ft)	1.5	2.6										
Pool Spacing (ft)	21	64										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	10	42										
Radius of Curvature (ft)	15	21										
Rc:Bankfull Width (ft/ft)	1.6	2.2										
Meander Wave Length (ft)	45	92										
Meander Width Ratio	1.0	4.4										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	1,039											
Sinuosity (ft)	1.20											
Water Surface Slope (ft/ft)	0.006											
Bankfull Slope (ft/ft)	0.006											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/7.1/12.2/28.5/42.9/90		SC/12/20.6/58.1/111.2/256									
% of Reach with Eroding Banks			0%									

Table 12e. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 2
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	9.0	9.6	9.5	10.5								
Floodprone Width (ft)	>200	>200	>200	>200								
Bankfull Mean Depth	0.5	0.6	0.7	0.7								
Bankfull Max Depth	1.1	1.2	1.2	1.4								
Bankfull Cross-sectional Area (ft^2)	5.2	5.3	7.1	7.6								
Width/Depth Ratio	15.3	17.6	12.8	14.5								
Entrenchment Ratio	>2.2		>2.2									
Bank Height Ratio	1.0		1.0	1.0								
D50 (mm)	20.1	27.4	41.3	50.6								
Profile												
Riffle Length (ft)	6	27										
Riffle Slope (ft/ft)	0.009	0.039										
Pool Length (ft)	11	45										
Pool Max Depth (ft)	1.5	2.5										
Pool Spacing (ft)	22	71										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	12	52										
Radius of Curvature (ft)	14	22										
Rc:Bankfull Width (ft/ft)	1.6	2.3										
Meander Wave Length (ft)	44	83										
Meander Width Ratio	1.3	5.4										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	1,440											
Sinuosity (ft)	1.30											
Water Surface Slope (ft/ft)	0.007											
Bankfull Slope (ft/ft)	0.007											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	2.4/11.6/20.7/56.1/86.7/180		8.5/20.1/32/90/160.7/512									
% of Reach with Eroding Banks			0%									

Table 12f. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3A
Monitoring Year 1

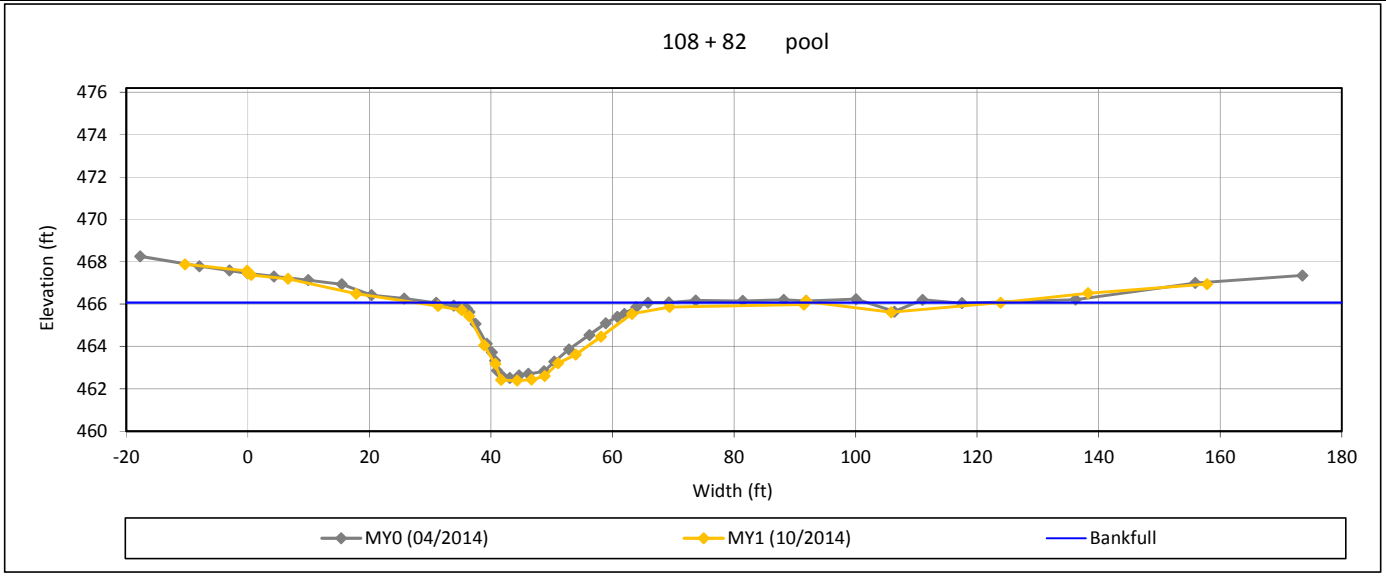
Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	10.5		11.1									
Floodprone Width (ft)	>200		>200									
Bankfull Mean Depth	0.7		0.7									
Bankfull Max Depth	1.2		1.3									
Bankfull Cross-sectional Area (ft^2)	7.2		7.6									
Width/Depth Ratio	15.3		16.2									
Entrenchment Ratio	>2.2		>2.2									
Bank Height Ratio	1.0		1.0									
D50 (mm)	32.0		45.0									
Profile												
Riffle Length (ft)	8	25										
Riffle Slope (ft/ft)	0.010	0.046										
Pool Length (ft)	10	42										
Pool Max Depth (ft)	1.77	2.98										
Pool Spacing (ft)	26	66										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	8	37										
Radius of Curvature (ft)	14	27										
Rc:Bankfull Width (ft/ft)	1.3	2.6										
Meander Wave Length (ft)	58	88										
Meander Width Ratio	0.8	3.5										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	658											
Sinuosity (ft)	1.20											
Water Surface Slope (ft/ft)	0.003											
Bankfull Slope (ft/ft)	0.002											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	22.6/27.4/32/53.7/69.7/128		16.0/30.3/41.5/87.0/202.4/362.0									
% of Reach with Eroding Banks			0%									

Table 12g. Monitoring Data - Stream Reach Data Summary
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3B
Monitoring Year 1

Parameter	As-Built/Baseline		MY-1		MY-2		MY-3		MY-4		MY-5	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Riffle												
Bankfull Width (ft)	13.9		12.6									
Floodprone Width (ft)	130		130									
Bankfull Mean Depth	0.8		1.2									
Bankfull Max Depth	1.6		1.8									
Bankfull Cross-sectional Area (ft^2)	11.8		14.9									
Width/Depth Ratio	16.5		10.6									
Entrenchment Ratio	9.3		10.3									
Bank Height Ratio	1.0		1.0									
D50 (mm)	33.4		30.6									
Profile												
Riffle Length (ft)	13	28										
Riffle Slope (ft/ft)	0.001	0.024										
Pool Length (ft)	32	45										
Pool Max Depth (ft)	2.45	3.32										
Pool Spacing (ft)	38	72										
Pool Volume (ft^3)												
Pattern												
Channel Beltwidth (ft)	20	61										
Radius of Curvature (ft)	24	31										
Rc:Bankfull Width (ft/ft)	1.7	2.2										
Meander Wave Length (ft)	87	105										
Meander Width Ratio	1.4	4.4										
Additional Reach Parameters												
Rosgen Classification	C4		C4									
Channel Thalweg Length (ft)	658											
Sinuosity (ft)	1.20											
Water Surface Slope (ft/ft)	0.003											
Bankfull Slope (ft/ft)	0.002											
Ri%/Ru%/P%/G%/S%												
SC%/Sa%/G%/C%/B%/Be%												
d16/d35/d50/d84/d95/d100	SC/4.9/13.3/67.2/89.9/128		SC/4.5/14.8/60.0/98.3/180.0									
% of Reach with Eroding Banks			3%									

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 1-Norkett Branch Reach 1



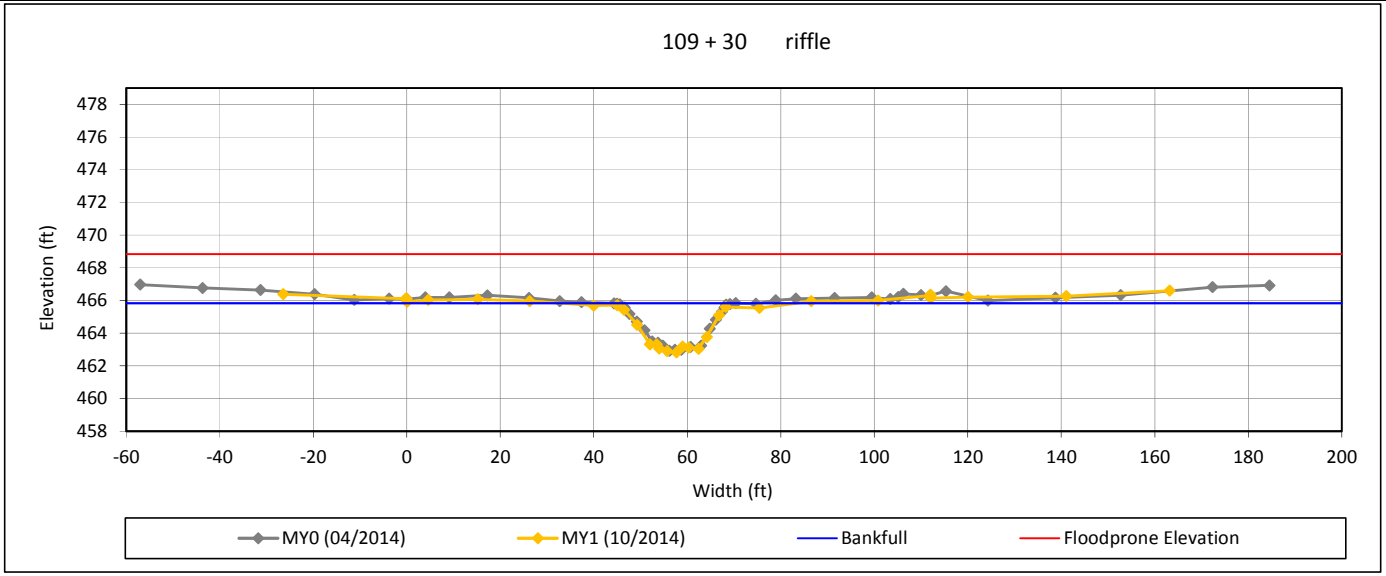
Bankfull Dimensions	
68.3	x-section area (ft.sq.)
34.1	width (ft)
2.0	mean depth (ft)
3.7	max depth (ft)
35.3	wetted parimeter (ft)
1.9	hyd radi (ft)
17.1	width-depth ratio

View Downstream

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 2-Norkett Branch Reach 1



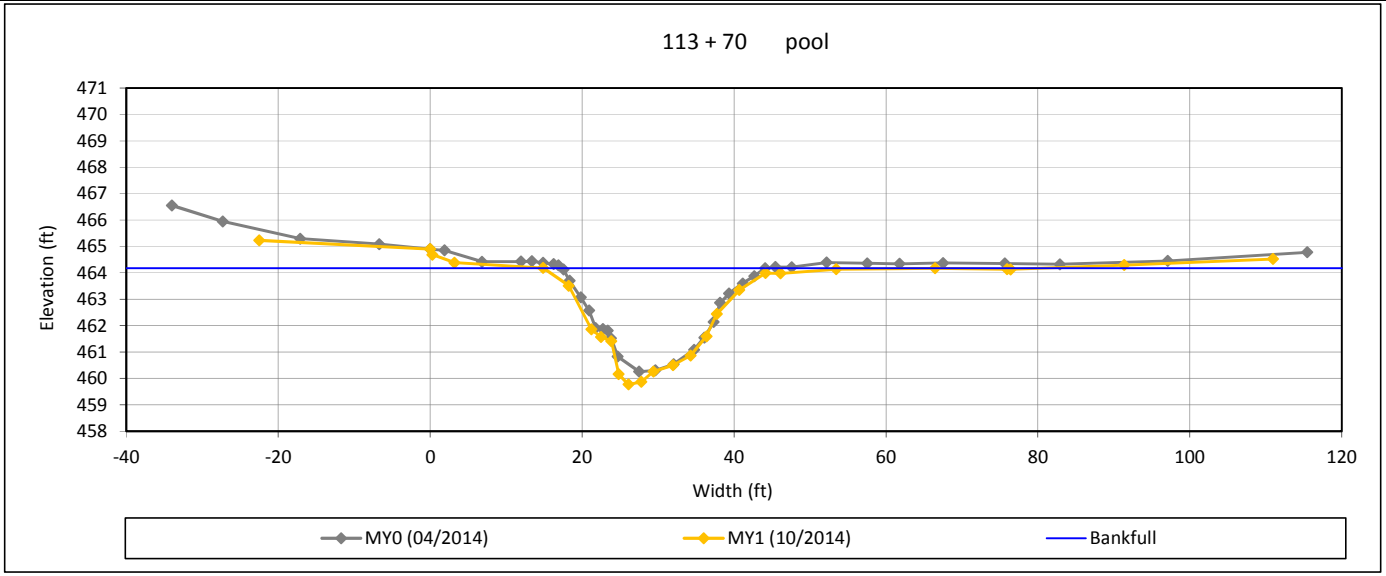
Bankfull Dimensions	
45.5	x-section area (ft.sq.)
23.2	width (ft)
2.0	mean depth (ft)
3.0	max depth (ft)
24.3	wetted parimeter (ft)
1.9	hyd radi (ft)
11.9	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 3-Norkett Branch Reach 1



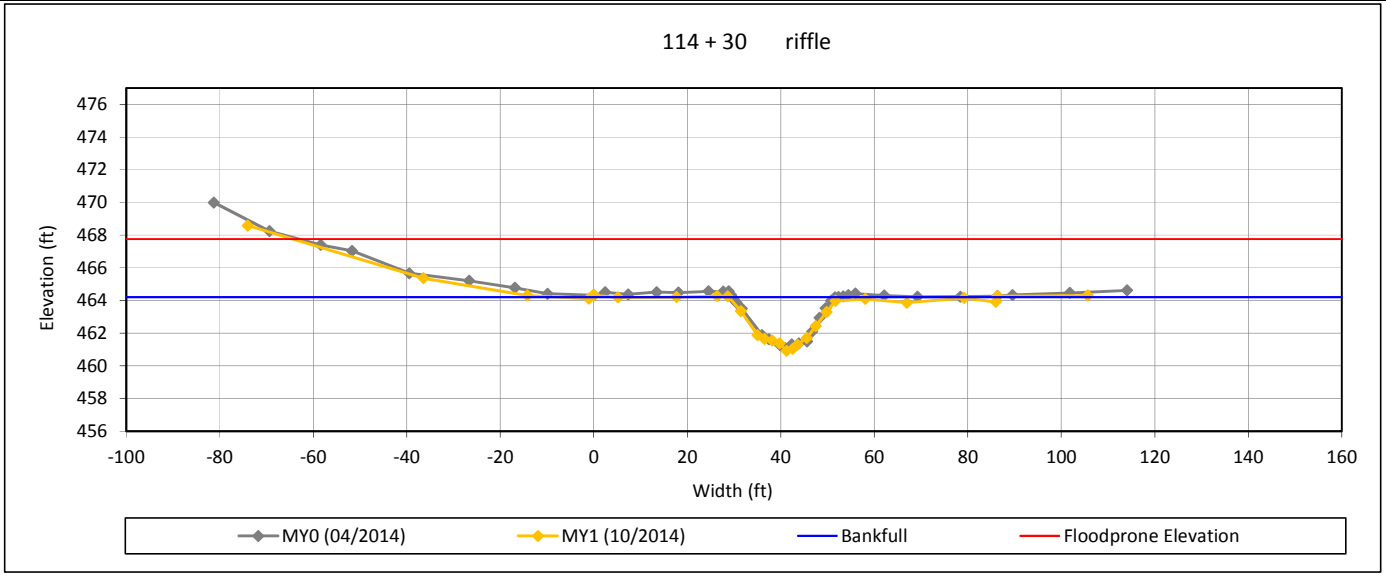
Bankfull Dimensions	
67.5	x-section area (ft.sq.)
29.2	width (ft)
2.3	mean depth (ft)
4.4	max depth (ft)
31.1	wetted parimeter (ft)
2.2	hyd radi (ft)
12.7	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 4-Norkett Branch Reach 1



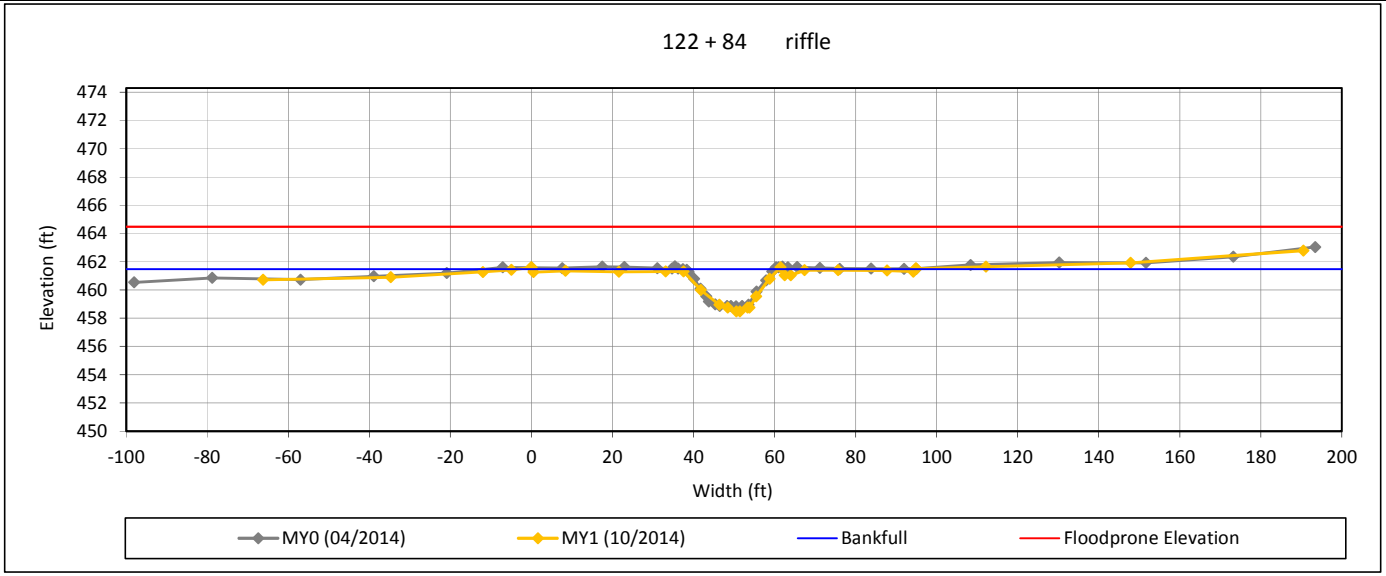
Bankfull Dimensions	
47.7	x-section area (ft.sq.)
23.1	width (ft)
2.1	mean depth (ft)
3.4	max depth (ft)
24.1	wetted parimeter (ft)
2.0	hyd radi (ft)
11.1	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 5-Norkett Branch Reach 1



Bankfull Dimensions	
42.3	x-section area (ft.sq.)
23.5	width (ft)
1.8	mean depth (ft)
3.0	max depth (ft)
24.4	wetted parimeter (ft)
1.7	hyd radi (ft)
13.1	width-depth ratio

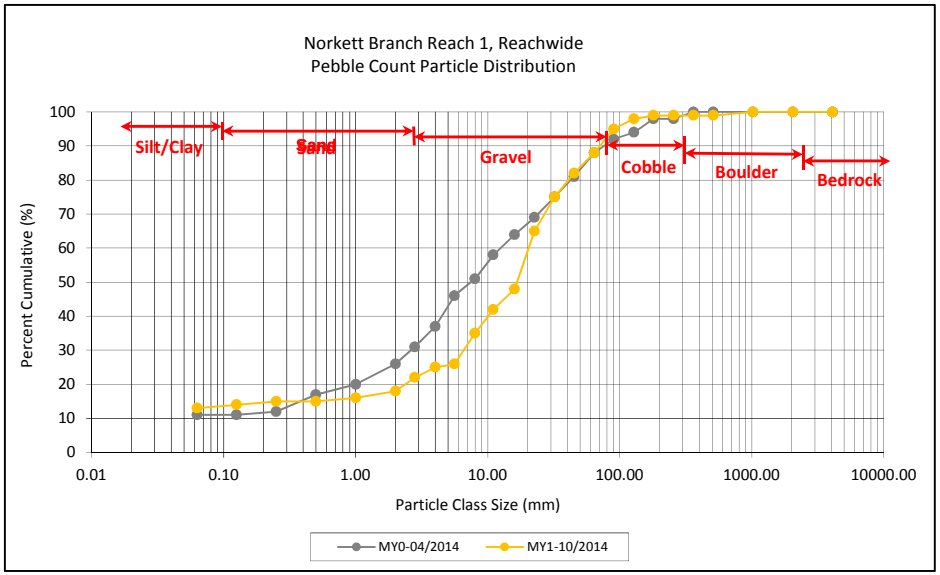
View Downstream

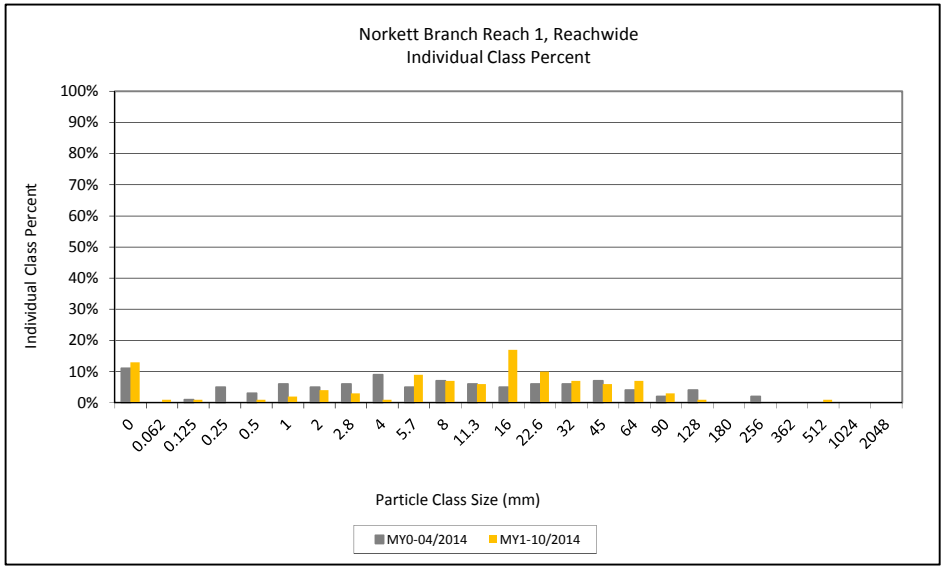
Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			Norkett Branch Reach 1 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	11	13	13	13
SAND	Very fine	0.062	0.125		1	1	1	14
	Fine	0.125	0.250		1	1	1	15
	Medium	0.250	0.500					15
	Coarse	0.5	1.0		1	1	1	16
	Very Coarse	1.0	2.0	1	1	2	2	18
GRAVEL	Very Fine	2.0	2.8	1	3	4	4	22
	Very Fine	2.8	4.0	2	1	3	3	25
	Fine	4.0	5.7		1	1	1	26
	Fine	5.7	8.0	4	5	9	9	35
	Medium	8.0	11.3	3	4	7	7	42
	Medium	11.3	16.0	3	3	6	6	48
	Coarse	16.0	22.6	12	5	17	17	65
	Coarse	22.6	32	5	5	10	10	75
	Very Coarse	32	45	7		7	7	82
	Very Coarse	45	64	3	3	6	6	88
COBBLE	Small	64	90	4	3	7	7	95
	Small	90	128	2	1	3	3	98
	Large	128	180	1		1	1	99
	Large	180	256					99
BOULDER	Small	256	362					99
	Small	362	512					99
	Medium	512	1024		1	1	1	100
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	1.0
D_{35} =	8.0
D_{50} =	16.7
D_{84} =	50.6
D_{95} =	90.0
D_{100} =	1024.0

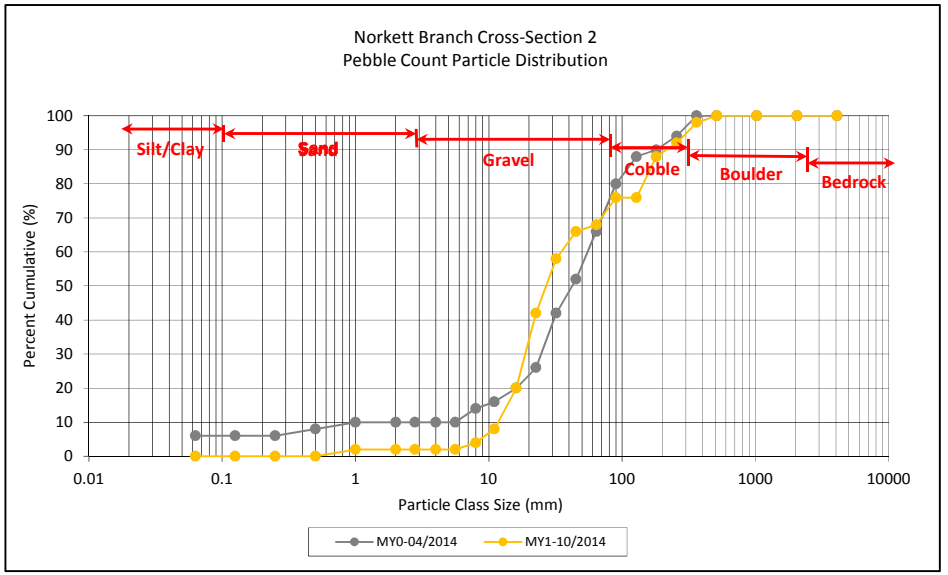


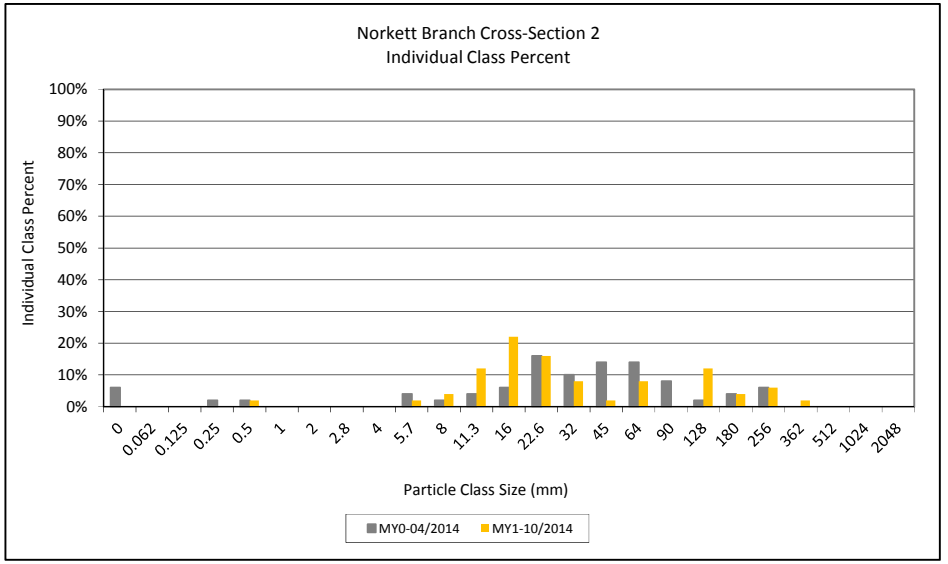


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1, Cross-Section 2
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 2 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0	2	2	2
	Very Coarse	1.0	2.0			2
GRAVEL	Very Fine	2.0	2.8			2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.7			2
	Fine	5.7	8.0	2	2	4
	Medium	8.0	11.3	4	4	8
	Medium	11.3	16.0	12	12	20
	Coarse	16.0	22.6	22	22	42
	Coarse	22.6	32	16	16	58
	Very Coarse	32	45	8	8	66
	Very Coarse	45	64	2	2	68
COBBLE	Small	64	90	8	8	76
	Small	90	128			76
	Large	128	180	12	12	88
	Large	180	256	4	4	92
BOULDER	Small	256	362	6	6	98
	Small	362	512	2	2	100
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

Cross-Section 2	
Channel materials (mm)	
D_{16} =	14.1
D_{35} =	20.2
D_{50} =	26.9
D_{84} =	160.7
D_{95} =	304.4
D_{100} =	512.0

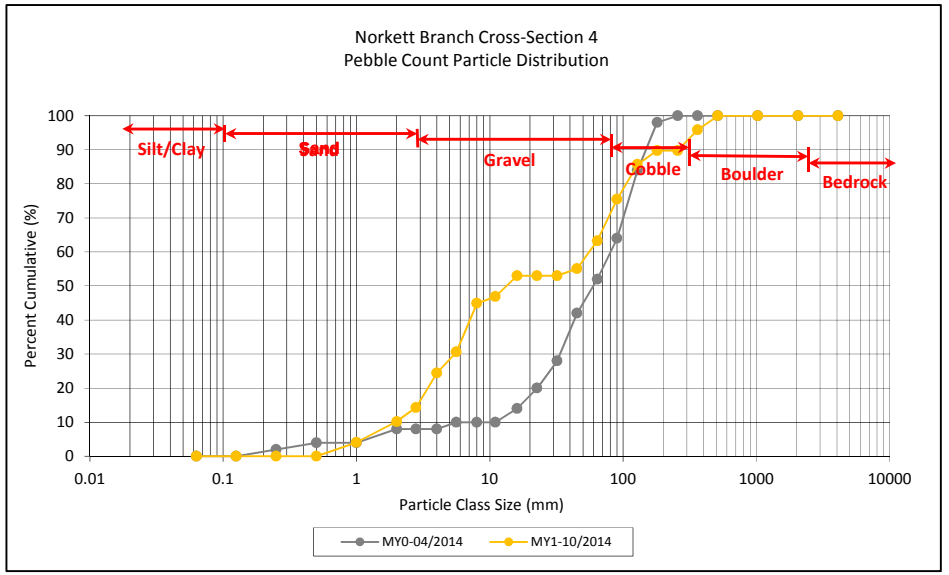


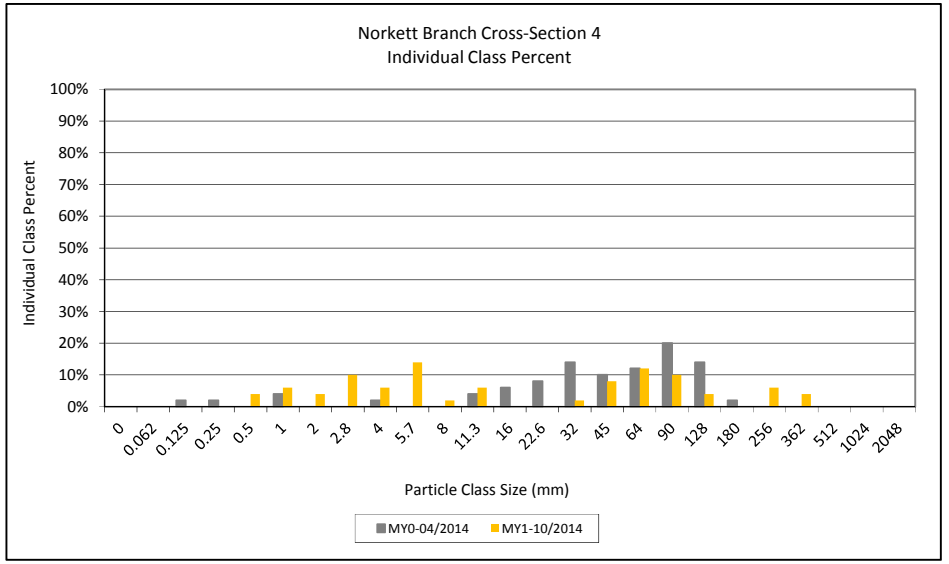


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1, Cross-Section 4
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 4 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0	4	4	4
	Very Coarse	1.0	2.0	6	6	10
GRAVEL	Very Fine	2.0	2.8	4	4	14
	Very Fine	2.8	4.0	10	10	24
	Fine	4.0	5.7	6	6	31
	Fine	5.7	8.0	14	14	45
	Medium	8.0	11.3	2	2	47
	Medium	11.3	16.0	6	6	53
	Coarse	16.0	22.6			53
	Coarse	22.6	32			53
	Very Coarse	32	45	2	2	55
	Very Coarse	45	64	8	8	63
COBBLE	Small	64	90	12	12	76
	Small	90	128	10	10	86
	Large	128	180	4	4	90
	Large	180	256			90
BOULDER	Small	256	362	6	6	96
	Small	362	512	4	4	100
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**98**	**100**	**100**

Cross-Section 4	
Channel materials (mm)	
D_{16} =	3.0
D_{35} =	6.2
D_{50} =	13.3
D_{84} =	120.6
D_{95} =	343.7
D_{100} =	512.0

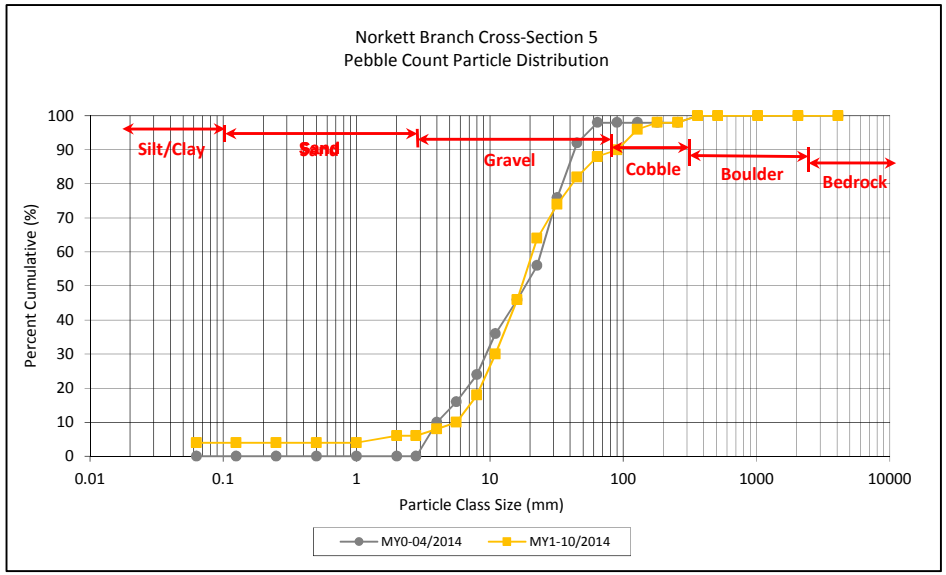


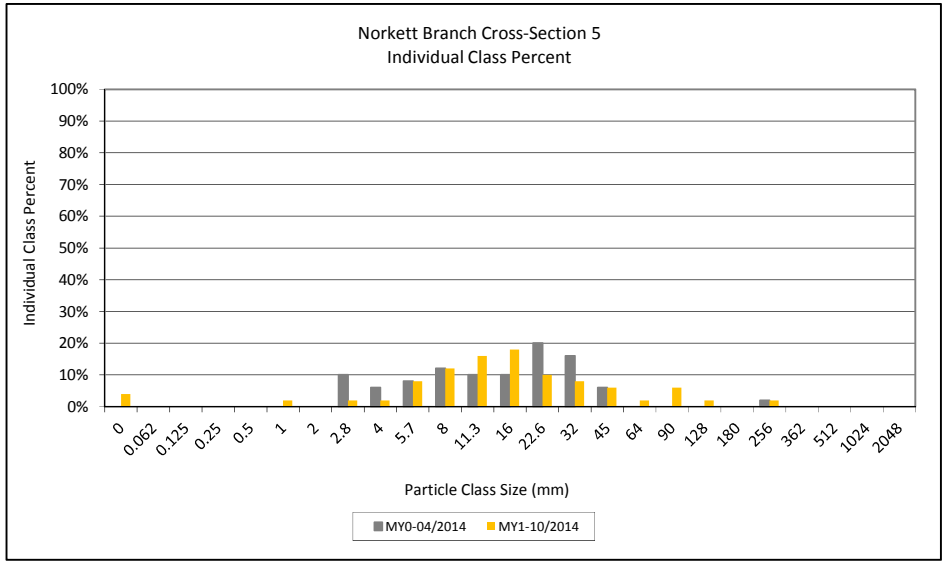


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 1, Cross-Section 5
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 5 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	4	4	4
SAND	Very fine	0.062	0.125			4
	Fine	0.125	0.250			4
	Medium	0.250	0.500			4
	Coarse	0.5	1.0			4
	Very Coarse	1.0	2.0	2	2	6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0	2	2	8
	Fine	4.0	5.7	2	2	10
	Fine	5.7	8.0	8	8	18
	Medium	8.0	11.3	12	12	30
	Medium	11.3	16.0	16	16	46
	Coarse	16.0	22.6	18	18	64
	Coarse	22.6	32	10	10	74
	Very Coarse	32	45	8	8	82
	Very Coarse	45	64	6	6	88
COBBLE	Small	64	90	2	2	90
	Small	90	128	6	6	96
	Large	128	180	2	2	98
	Large	180	256			98
BOULDER	Small	256	362	2	2	100
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

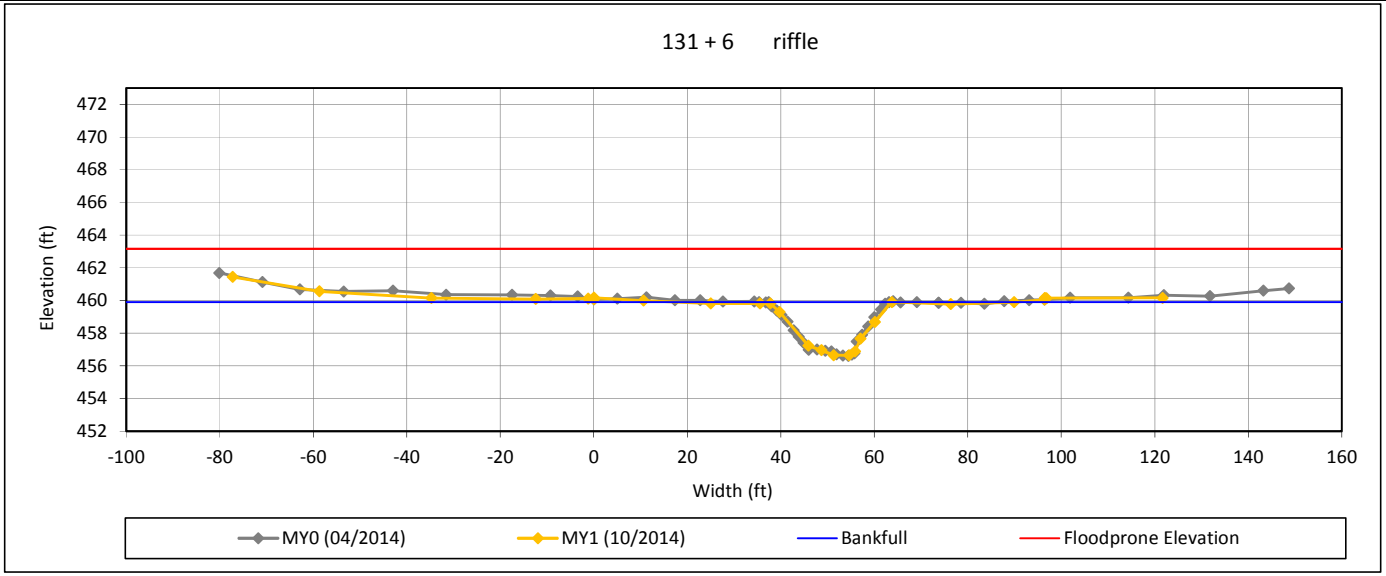
Cross-Section 5	
Channel materials (mm)	
D_{16} =	7.3
D_{35} =	12.4
D_{50} =	17.3
D_{84} =	50.6
D_{95} =	120.7
D_{100} =	362.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 6-Norkett Branch Reach 2



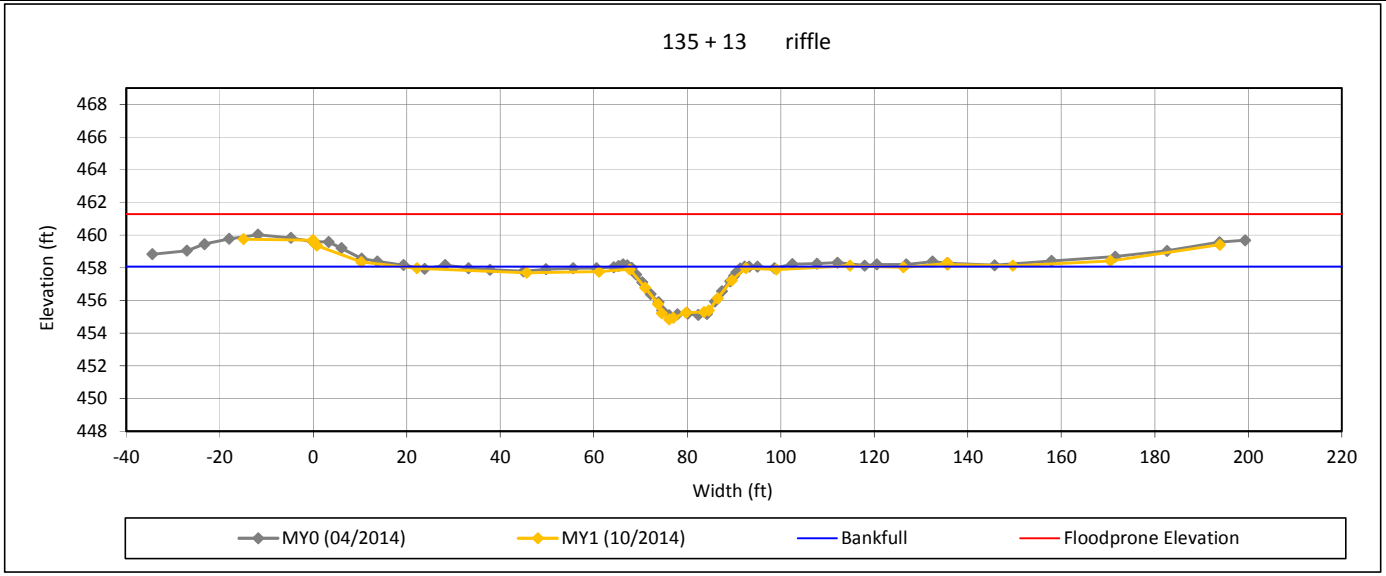
Bankfull Dimensions	
52.0	x-section area (ft.sq.)
26.0	width (ft)
2.0	mean depth (ft)
3.3	max depth (ft)
27.0	wetted parimeter (ft)
1.9	hyd radi (ft)
13.0	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 7-Norkett Branch Reach 2



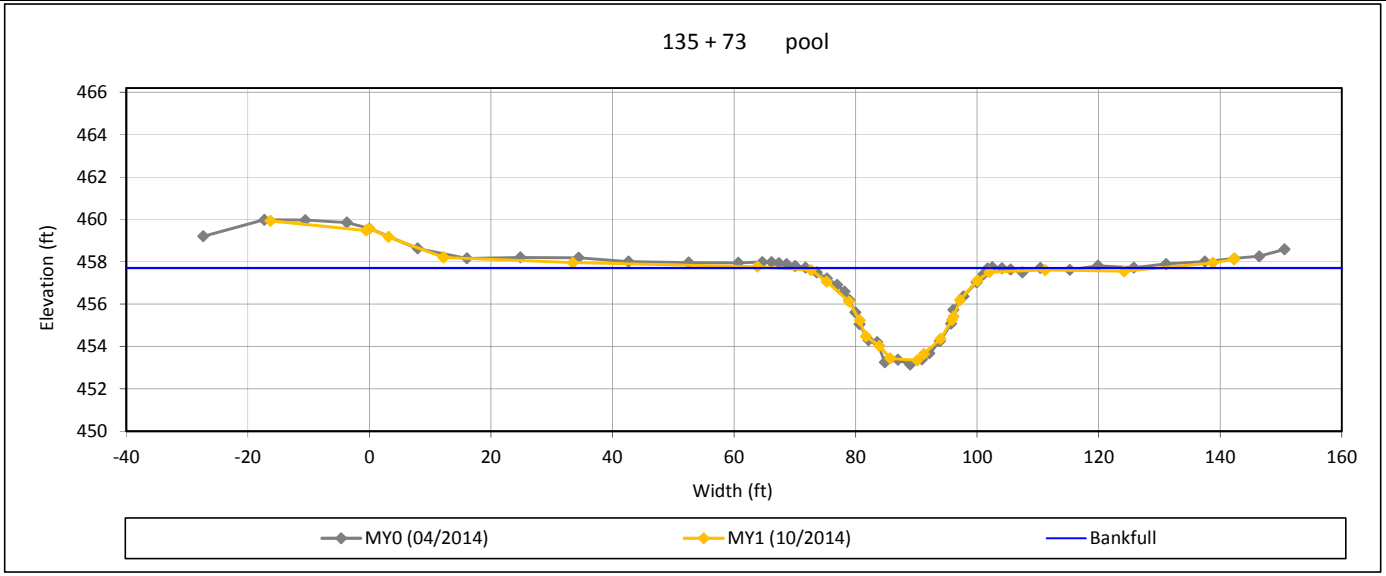
Bankfull Dimensions	
48.7	x-section area (ft.sq.)
24.9	width (ft)
2.0	mean depth (ft)
3.2	max depth (ft)
25.9	wetted parimeter (ft)
1.9	hyd radi (ft)
12.7	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 8-Norkett Branch Reach 2



Bankfull Dimensions	
71.0	x-section area (ft.sq.)
26.8	width (ft)
2.7	mean depth (ft)
4.4	max depth (ft)
28.3	wetted parimeter (ft)
2.5	hyd radi (ft)
10.1	width-depth ratio

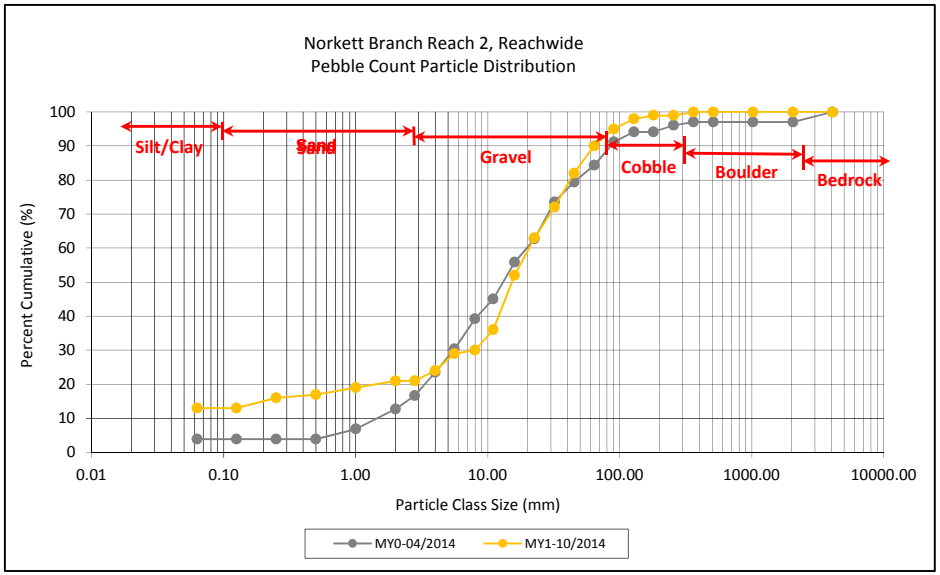
Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

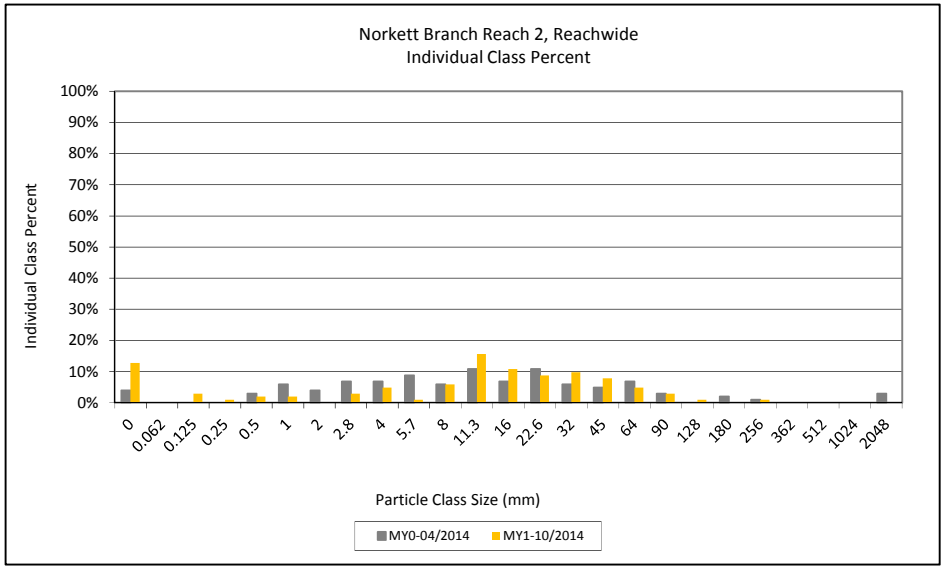
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 2, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			Norkett Branch Reach 2 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	11	13	13	13
SAND	Very fine	0.062	0.125			0	0	13
	Fine	0.125	0.250	1	2	3	3	16
	Medium	0.250	0.500		1	1	1	17
	Coarse	0.5	1.0	2		2	2	19
	Very Coarse	1.0	2.0	2		2	2	21
GRAVEL	Very Fine	2.0	2.8			0	0	21
	Very Fine	2.8	4.0		3	3	3	24
	Fine	4.0	5.7	1	4	5	5	29
	Fine	5.7	8.0		1	1	1	30
	Medium	8.0	11.3	2	4	6	6	36
	Medium	11.3	16.0	8	8	16	16	52
	Coarse	16.0	22.6	6	5	11	11	63
	Coarse	22.6	32	7	2	9	9	72
	Very Coarse	32	45	5	5	10	10	82
	Very Coarse	45	64	7	1	8	8	90
COBBLE	Small	64	90	3	2	5	5	95
	Small	90	128	2	1	3	3	98
	Large	128	180	1		1	1	99
	Large	180	256			0	0	99
BOULDER	Small	256	362	1		1	1	100
	Small	362	512					
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	0.3
D_{35} =	10.4
D_{50} =	15.3
D_{84} =	49.1
D_{95} =	90.0
D_{100} =	362.0

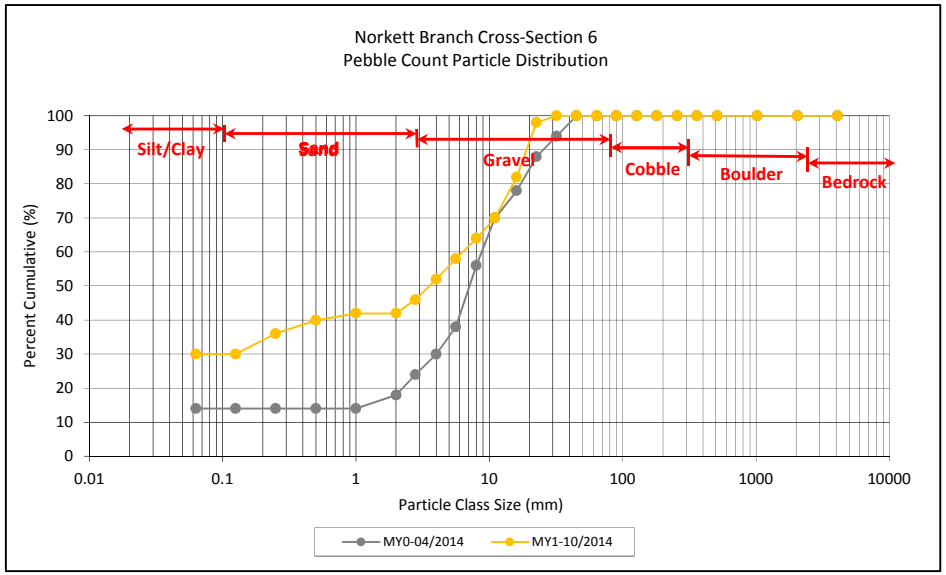


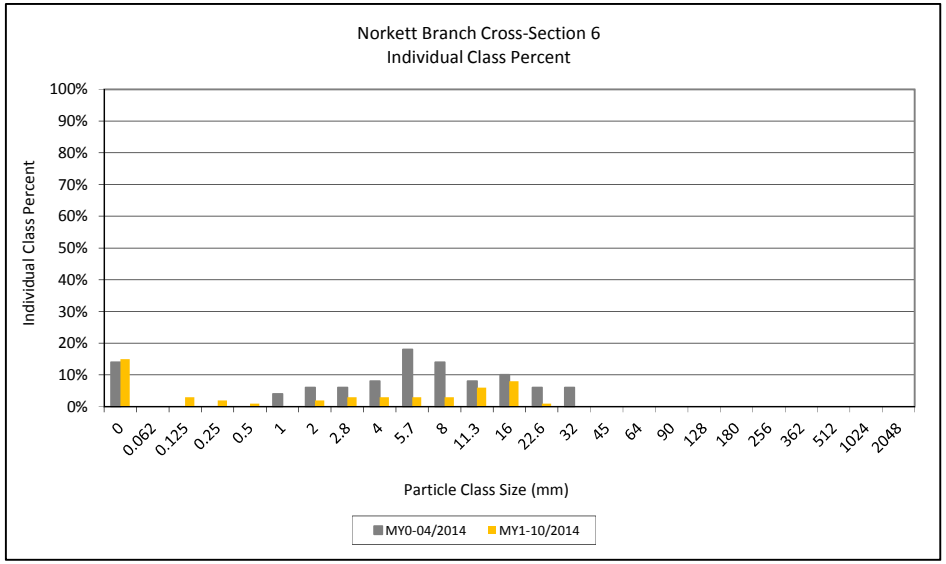


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 2, Cross-Section 6
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 6 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	30	30	30
SAND	Very fine	0.062	0.125			30
	Fine	0.125	0.250	6	6	36
	Medium	0.250	0.500	4	4	40
	Coarse	0.5	1.0	2	2	42
	Very Coarse	1.0	2.0			42
GRAVEL	Very Fine	2.0	2.8	4	4	46
	Very Fine	2.8	4.0	6	6	52
	Fine	4.0	5.7	6	6	58
	Fine	5.7	8.0	6	6	64
	Medium	8.0	11.3	6	6	70
	Medium	11.3	16.0	12	12	82
	Coarse	16.0	22.6	16	16	98
	Coarse	22.6	32	2	2	100
	Very Coarse	32	45			
	Very Coarse	45	64			
COBBLE	Small	64	90			
	Small	90	128			
	Large	128	180			
	Large	180	256			
BOULDER	Small	256	362			
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

Cross-Section 6	
Channel materials (mm)	
D_{16} =	Silt / Clay
D_{35} =	0.2
D_{50} =	3.6
D_{84} =	16.7
D_{95} =	21.2
D_{100} =	32.0

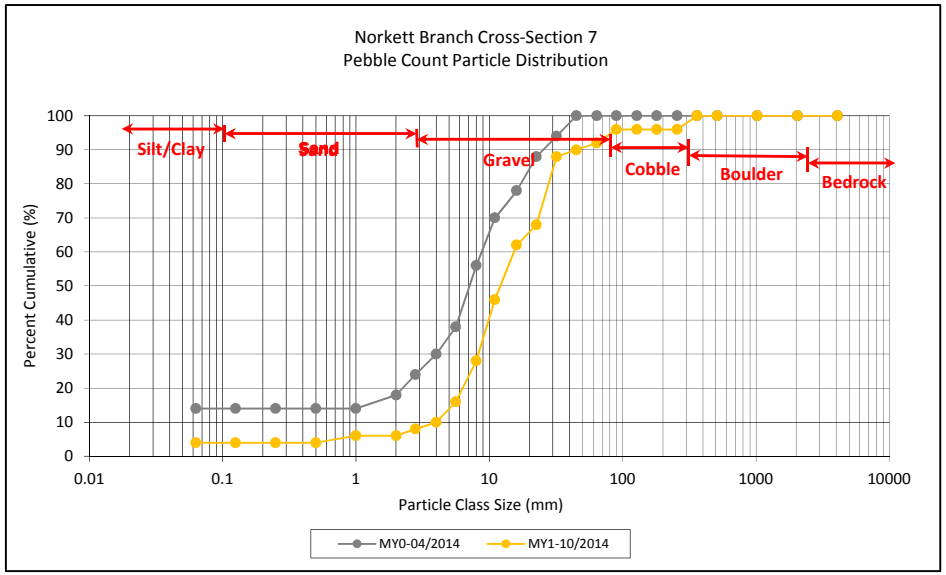


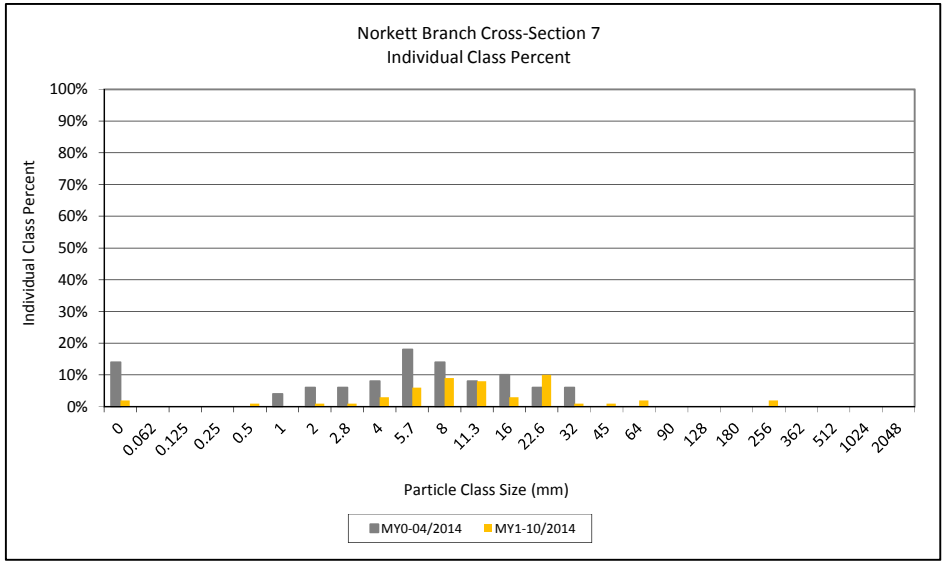


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Norkett Branch Reach 2, Cross-Section 7
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 7 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	4	4	4
SAND	Very fine	0.062	0.125			4
	Fine	0.125	0.250			4
	Medium	0.250	0.500			4
	Coarse	0.5	1.0	2	2	6
	Very Coarse	1.0	2.0			6
GRAVEL	Very Fine	2.0	2.8	2	2	8
	Very Fine	2.8	4.0	2	2	10
	Fine	4.0	5.7	6	6	16
	Fine	5.7	8.0	12	12	28
	Medium	8.0	11.3	18	18	46
	Medium	11.3	16.0	16	16	62
	Coarse	16.0	22.6	6	6	68
	Coarse	22.6	32	20	20	88
	Very Coarse	32	45	2	2	90
	Very Coarse	45	64	2	2	92
COBBLE	Small	64	90	4	4	96
	Small	90	128			96
	Large	128	180			96
	Large	180	256			96
BOULDER	Small	256	362	4	4	100
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

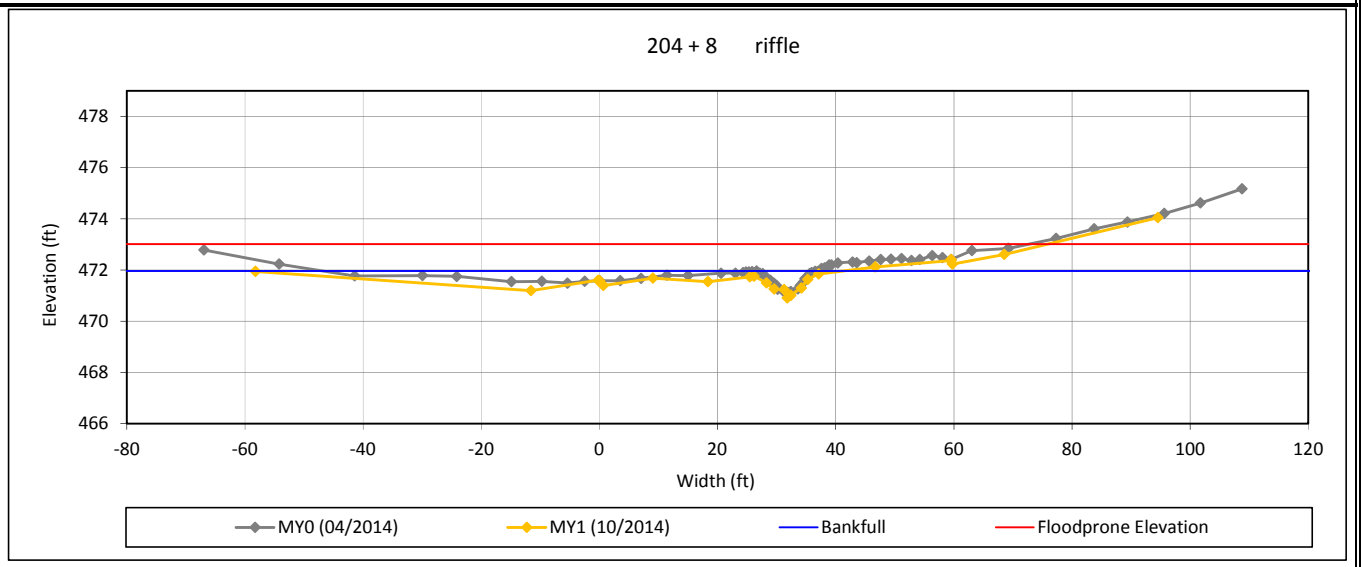
Cross-Section 7	
Channel materials (mm)	
D_{16} =	5.6
D_{35} =	9.1
D_{50} =	12.1
D_{84} =	29.8
D_{95} =	82.6
D_{100} =	362.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 9-UT1



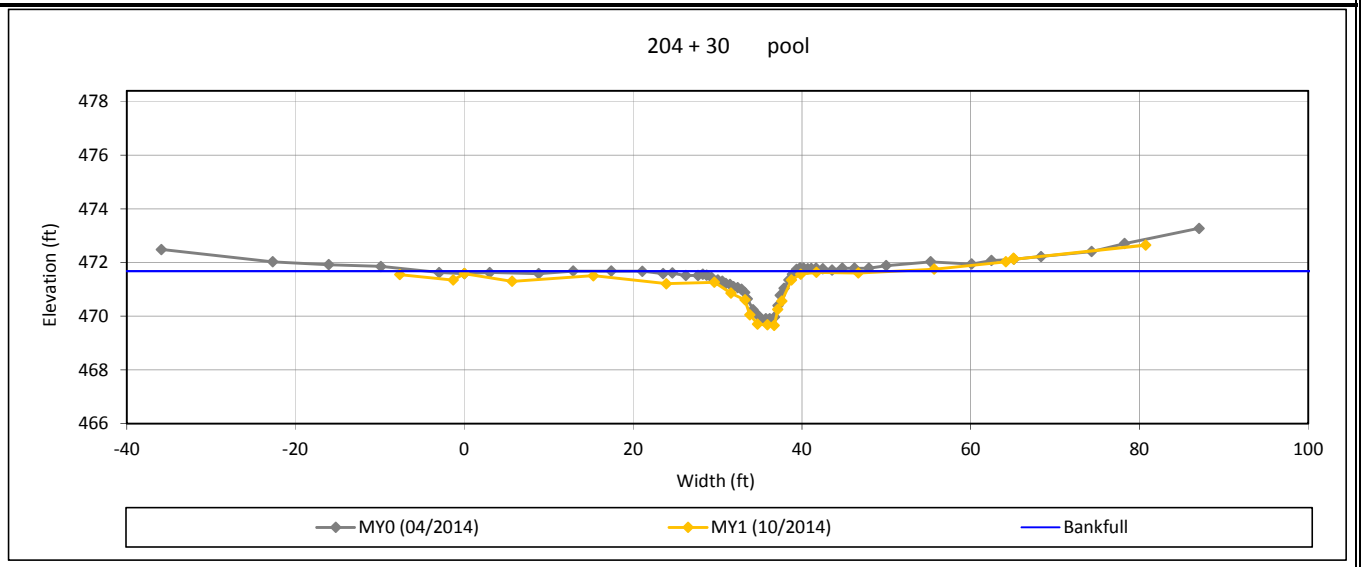
Bankfull Dimensions	
6.2	x-section area (ft.sq.)
11.6	width (ft)
0.5	mean depth (ft)
1.1	max depth (ft)
11.9	wetted parimeter (ft)
0.5	hyd radi (ft)
21.7	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 10-UT1



Bankfull Dimensions	
14.0	x-section area (ft.sq.)
15.9	width (ft)
0.9	mean depth (ft)
2.0	max depth (ft)
16.9	wetted parimeter (ft)
0.8	hyd radi (ft)
18.0	width-depth ratio

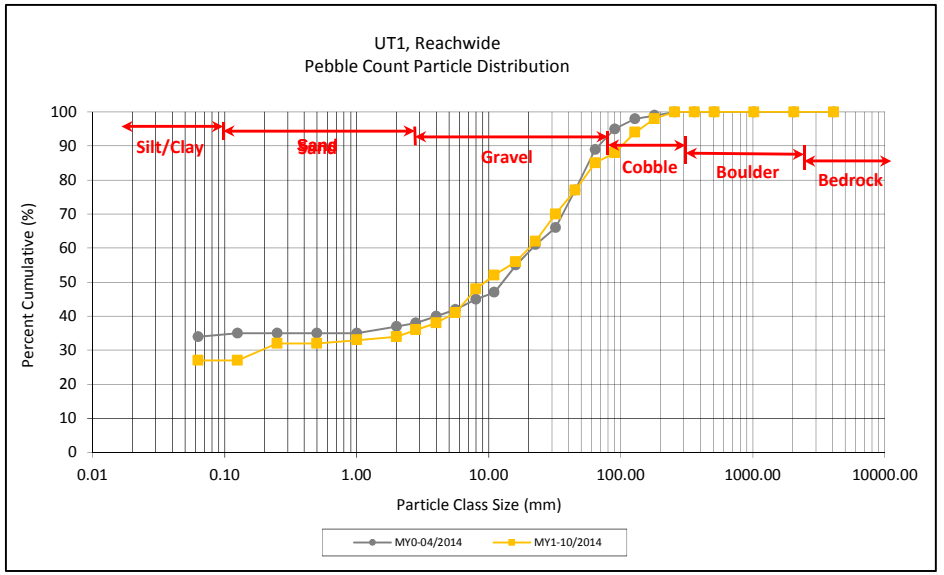
Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

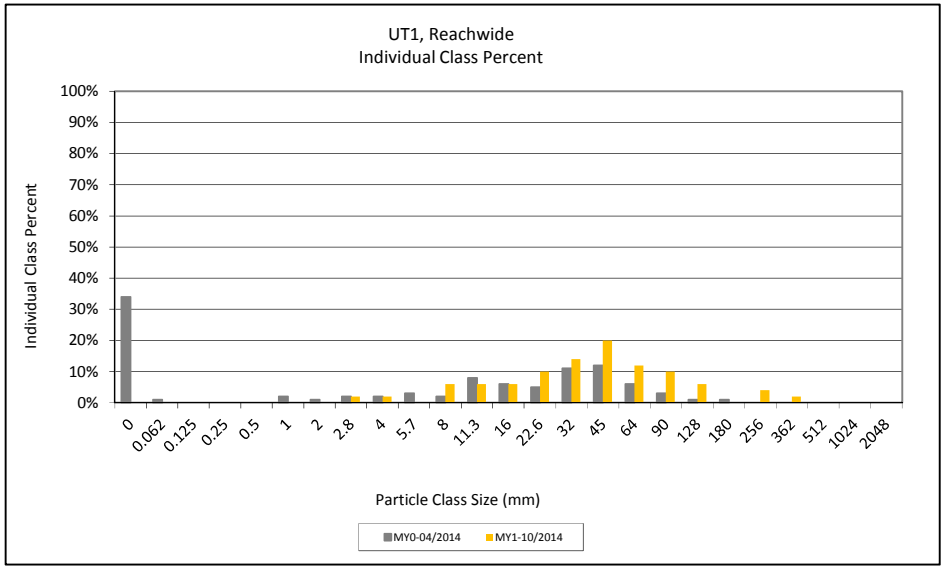
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT1, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			UT1 Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	26	27	27	27
SAND	Very fine	0.062	0.125			0	0	27
	Fine	0.125	0.250		5	5	5	32
	Medium	0.250	0.500			0	0	32
	Coarse	0.5	1.0		1	1	1	33
	Very Coarse	1.0	2.0	1		1	1	34
GRAVEL	Very Fine	2.0	2.8		2	2	2	36
	Very Fine	2.8	4.0		2	2	2	38
	Fine	4.0	5.7		3	3	3	41
	Fine	5.7	8.0	2	5	7	7	48
	Medium	8.0	11.3	2	2	4	4	52
	Medium	11.3	16.0	3	1	4	4	56
	Coarse	16.0	22.6	5	1	6	6	62
	Coarse	22.6	32	7	1	8	8	70
	Very Coarse	32	45	6	1	7	7	77
	Very Coarse	45	64	8		8	8	85
COBBLE	Small	64	90	3		3	3	88
	Small	90	128	6		6	6	94
	Large	128	180	4		4	4	98
	Large	180	256	2		2	2	100
BOULDER	Small	256	362					
	Small	362	512					
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	2.4
D_{50} =	9.4
D_{84} =	61.2
D_{95} =	139.4
D_{100} =	256.0

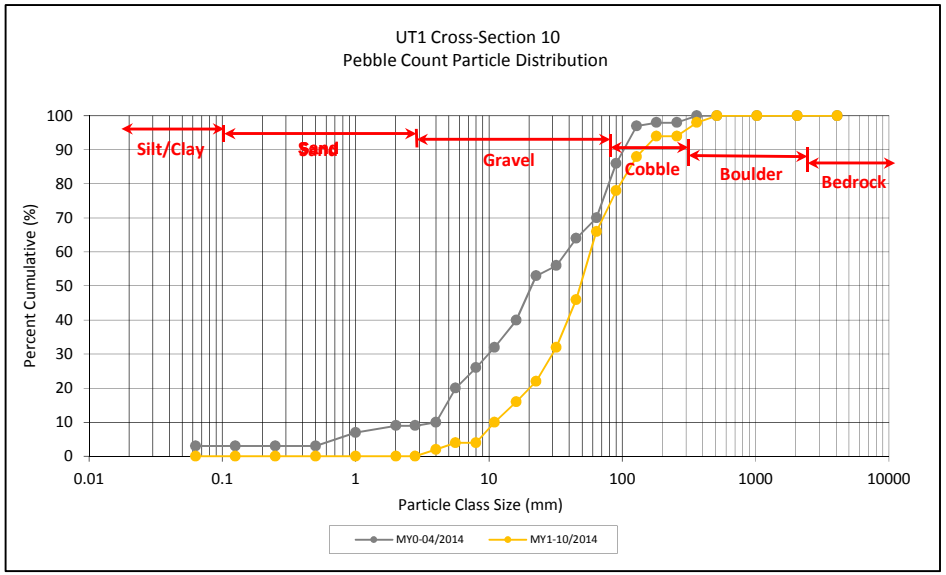


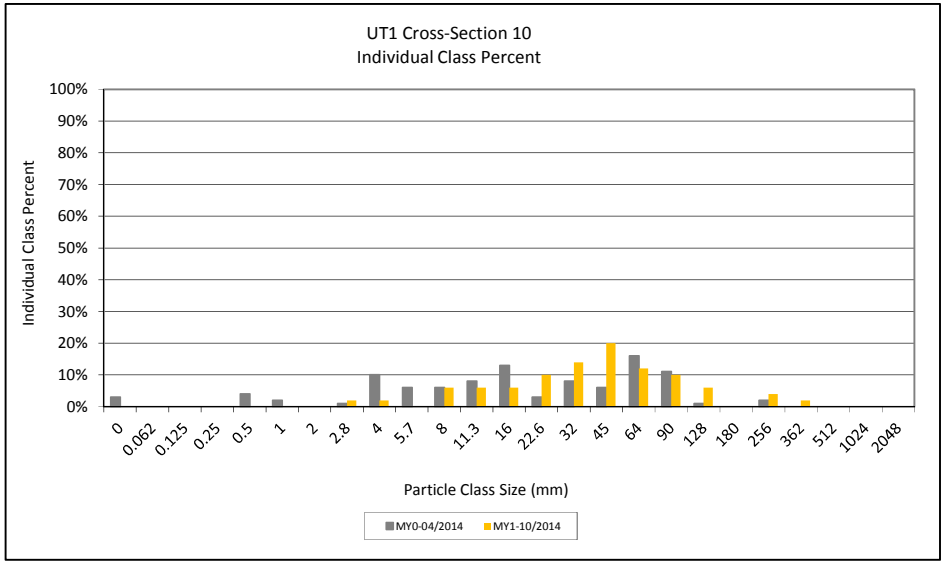


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT1, Cross-Section 10
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 10 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0	2	2	2
	Fine	4.0	5.7	2	2	4
	Fine	5.7	8.0			4
	Medium	8.0	11.3	6	6	10
	Medium	11.3	16.0	6	6	16
	Coarse	16.0	22.6	6	6	22
	Coarse	22.6	32	10	10	32
	Very Coarse	32	45	14	14	46
	Very Coarse	45	64	20	20	66
COBBLE	Small	64	90	12	12	78
	Small	90	128	10	10	88
	Large	128	180	6	6	94
	Large	180	256			94
BOULDER	Small	256	362	4	4	98
	Small	362	512	2	2	100
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

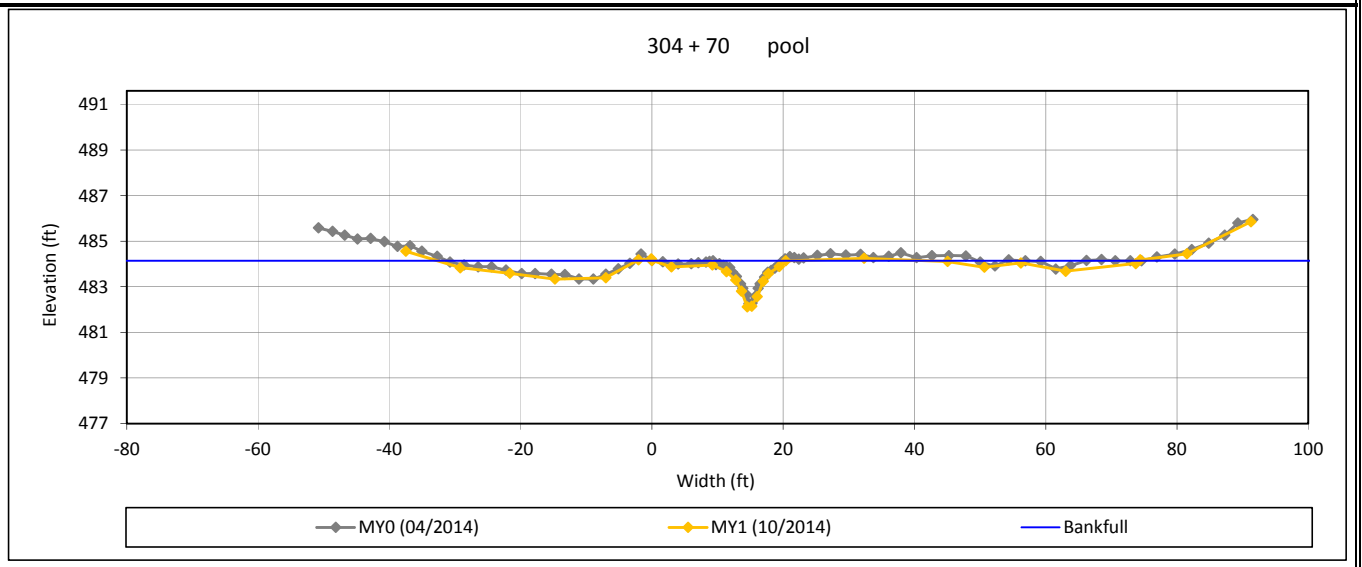
Cross-Section 10	
Channel materials (mm)	
D_{16} =	16.0
D_{35} =	34.4
D_{50} =	48.3
D_{84} =	111.2
D_{95} =	279.2
D_{100} =	512.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 11-UT2 Reach 1



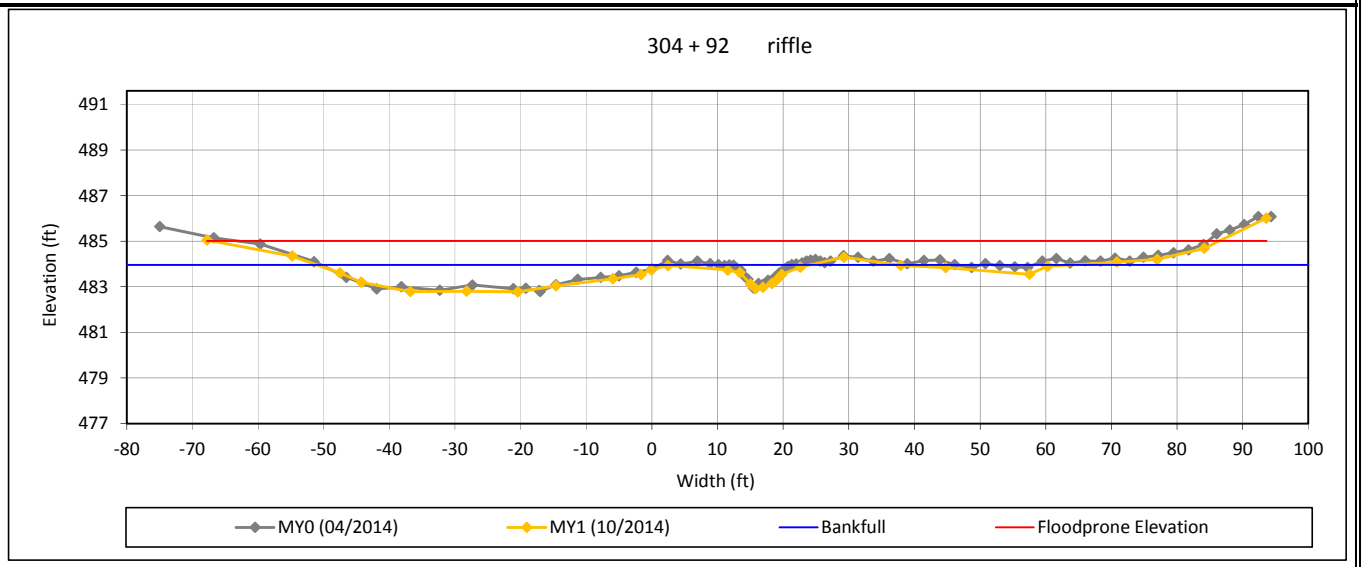
Bankfull Dimensions	
9.4	x-section area (ft.sq.)
11.1	width (ft)
0.8	mean depth (ft)
2.0	max depth (ft)
12.0	wetted parimeter (ft)
0.8	hyd radi (ft)
13.2	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 12-UT2 Reach 1



Bankfull Dimensions	
5.6	x-section area (ft.sq.)
11.1	width (ft)
0.5	mean depth (ft)
1.1	max depth (ft)
11.3	wetted parimeter (ft)
0.5	hyd radi (ft)
22.0	width-depth ratio

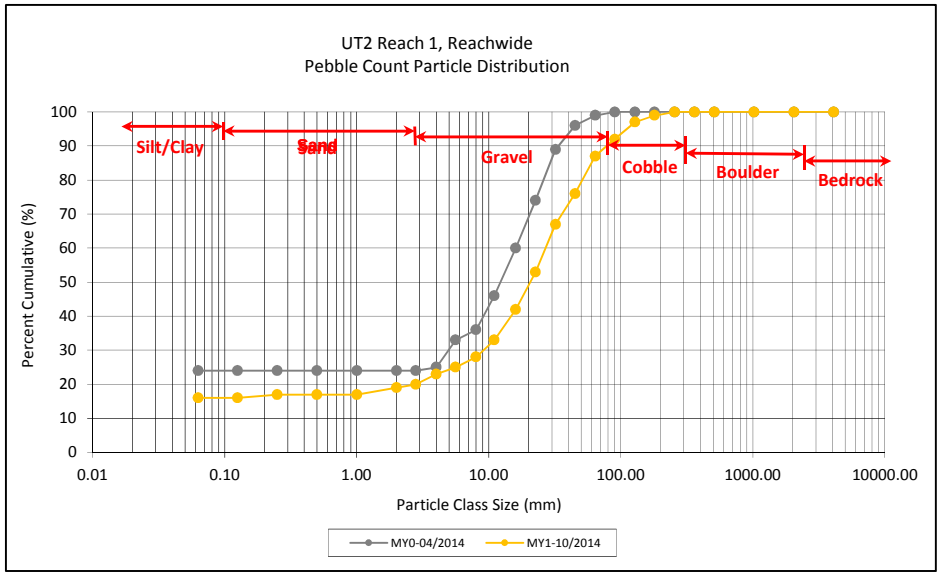
Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

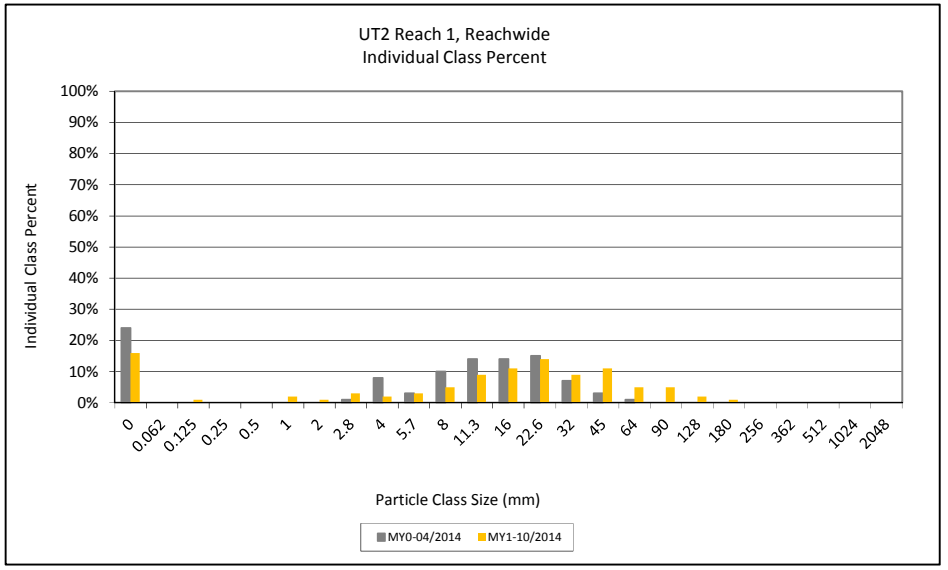
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 1, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			UT2 Reach 1 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	15	16	16	16
SAND	Very fine	0.062	0.125			0	0	16
	Fine	0.125	0.250	1		1	1	17
	Medium	0.250	0.500			0	0	17
	Coarse	0.5	1.0			0	0	17
	Very Coarse	1.0	2.0		2	2	2	19
GRAVEL	Very Fine	2.0	2.8		1	1	1	20
	Very Fine	2.8	4.0		3	3	3	23
	Fine	4.0	5.7		2	2	2	25
	Fine	5.7	8.0	1	2	3	3	28
	Medium	8.0	11.3	3	2	5	5	33
	Medium	11.3	16.0	2	7	9	9	42
	Coarse	16.0	22.6	5	6	11	11	53
	Coarse	22.6	32	9	5	14	14	67
	Very Coarse	32	45	6	3	9	9	76
	Very Coarse	45	64	9	2	11	11	87
COBBLE	Small	64	90	5		5	5	92
	Small	90	128	5		5	5	97
	Large	128	180	2		2	2	99
	Large	180	256	1		1	1	100
BOULDER	Small	256	362					
	Small	362	512					
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	12.0
D_{50} =	20.6
D_{84} =	58.1
D_{95} =	111.2
D_{100} =	256.0

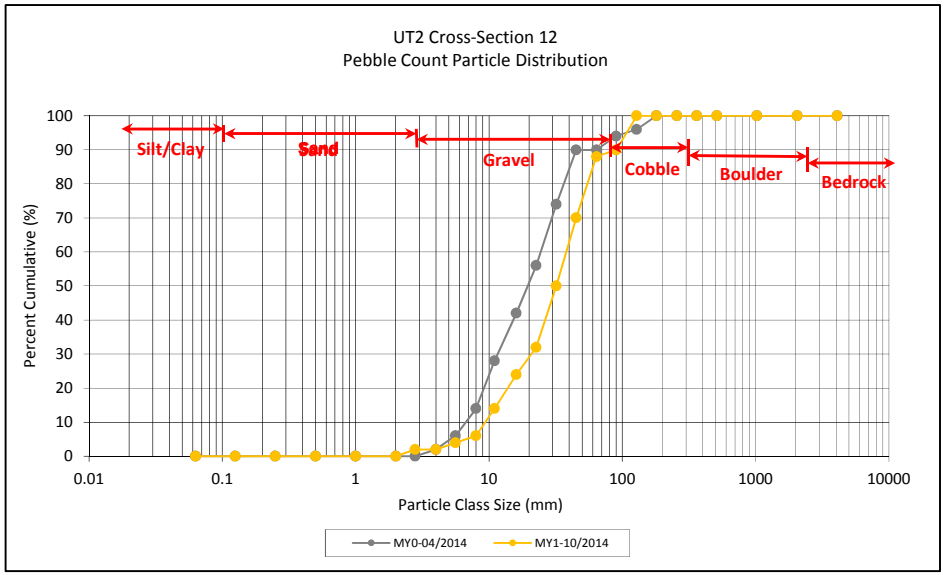


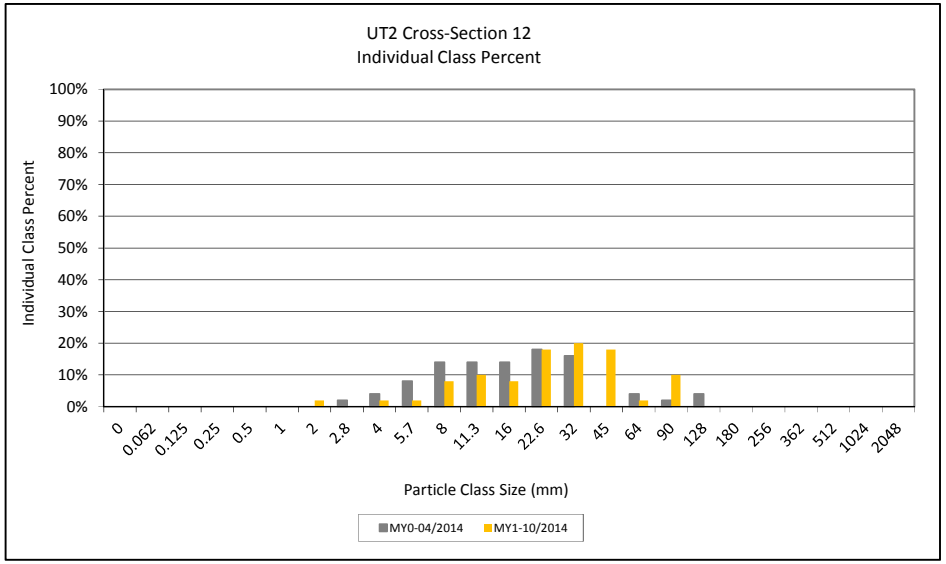


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 1, Cross-Section 12
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 12 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8	2	2	2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.7	2	2	4
	Fine	5.7	8.0	2	2	6
	Medium	8.0	11.3	8	8	14
	Medium	11.3	16.0	10	10	24
	Coarse	16.0	22.6	8	8	32
	Coarse	22.6	32	18	18	50
	Very Coarse	32	45	20	20	70
	Very Coarse	45	64	18	18	88
COBBLE	Small	64	90	2	2	90
	Small	90	128	10	10	100
	Large	128	180			
	Large	180	256			
BOULDER	Small	256	362			
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

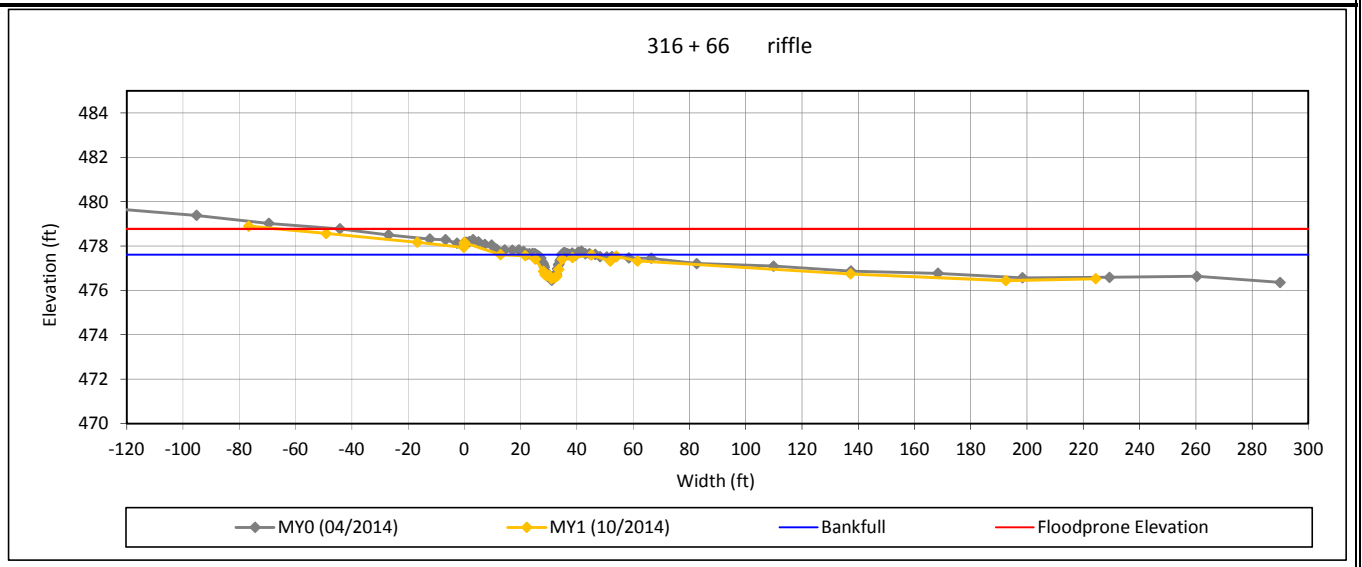
Cross-Section 12	
Channel materials (mm)	
D_{16} =	11.9
D_{35} =	23.9
D_{50} =	32.0
D_{84} =	59.2
D_{95} =	107.3
D_{100} =	128.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 13-UT2 Reach 2



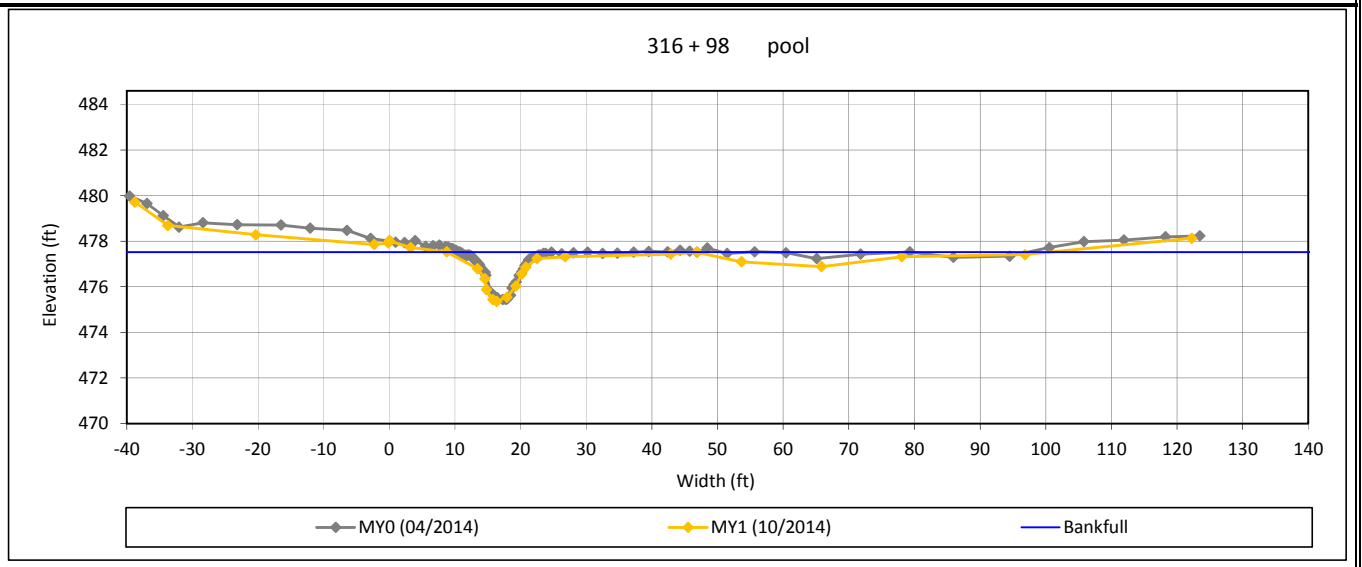
Bankfull Dimensions	
7.1	x-section area (ft.sq.)
9.5	width (ft)
0.7	mean depth (ft)
1.2	max depth (ft)
9.8	wetted parimeter (ft)
0.7	hyd radi (ft)
12.8	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 14-UT2 Reach 2



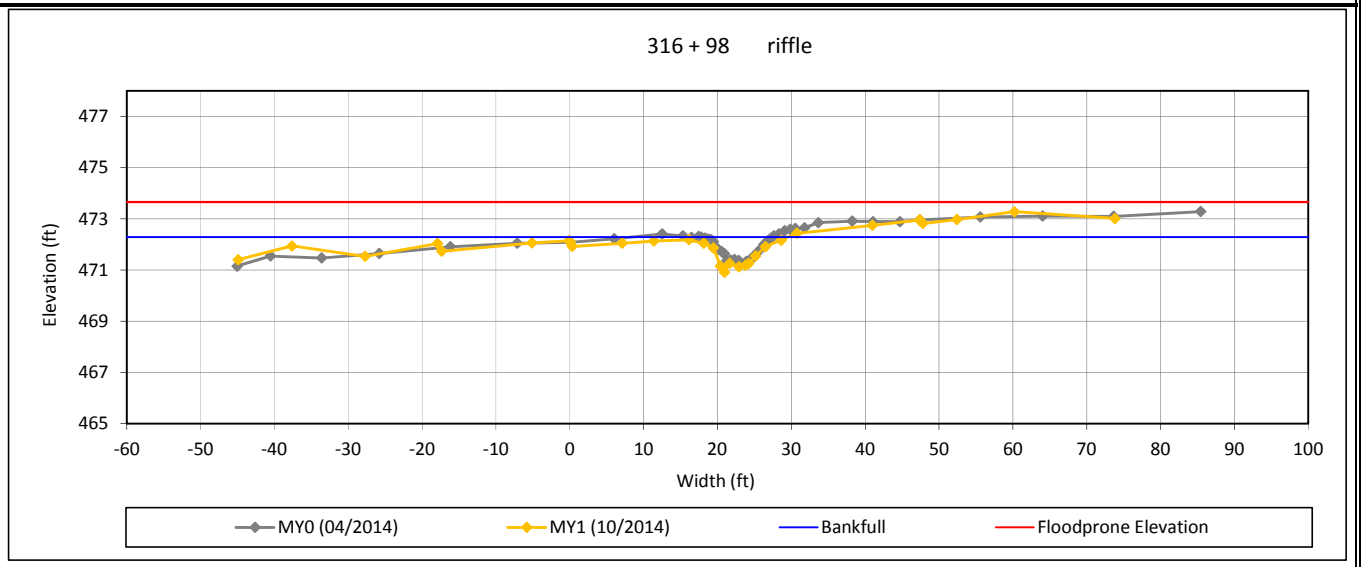
Bankfull Dimensions	
14.1	x-section area (ft.sq.)
13.7	width (ft)
1.0	mean depth (ft)
2.2	max depth (ft)
14.5	wetted parimeter (ft)
1.0	hyd radi (ft)
13.2	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 15-UT2 Reach 2



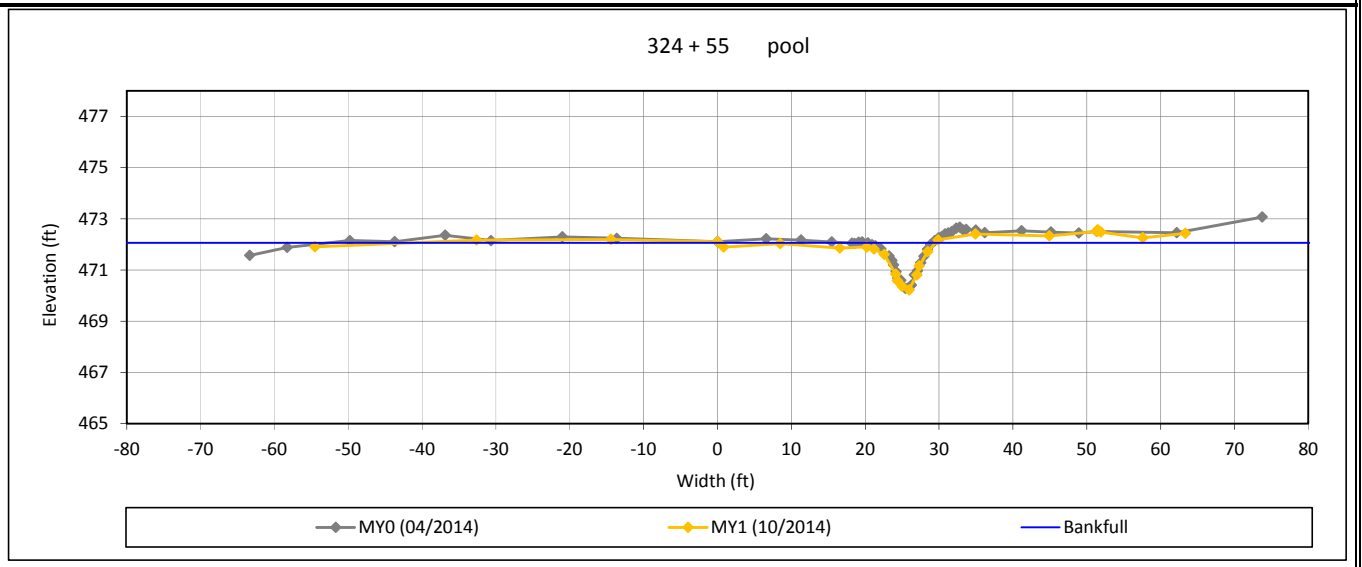
Bankfull Dimensions	
7.6	x-section area (ft.sq.)
10.5	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
11.0	wetted parimeter (ft)
0.7	hyd radi (ft)
14.5	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 16-UT2 Reach 2



Bankfull Dimensions	
8.1	x-section area (ft.sq.)
9.4	width (ft)
0.9	mean depth (ft)
1.9	max depth (ft)
10.3	wetted parimeter (ft)
0.8	hyd radi (ft)
10.9	width-depth ratio

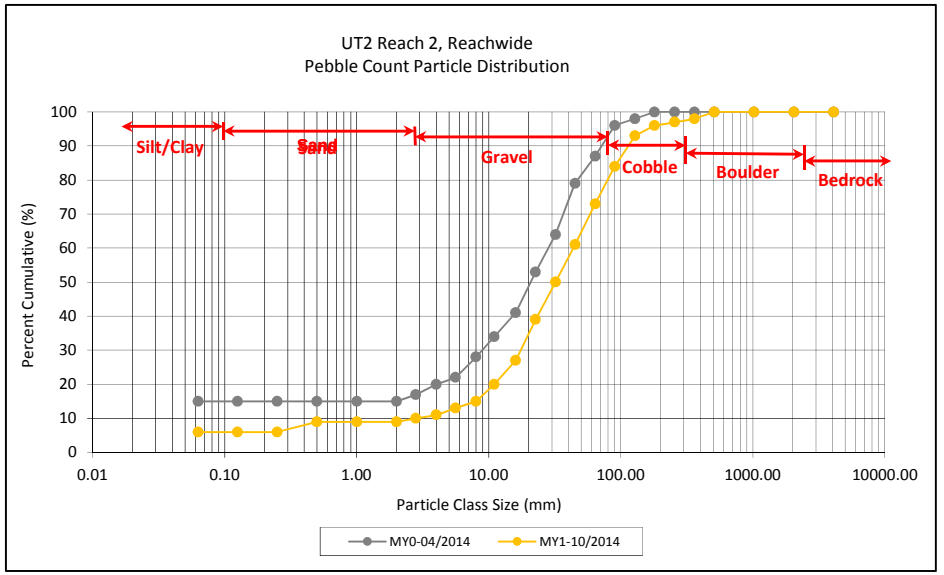
Survey Date: October 2014
Field Crew: Wildlands Engineering Inc.

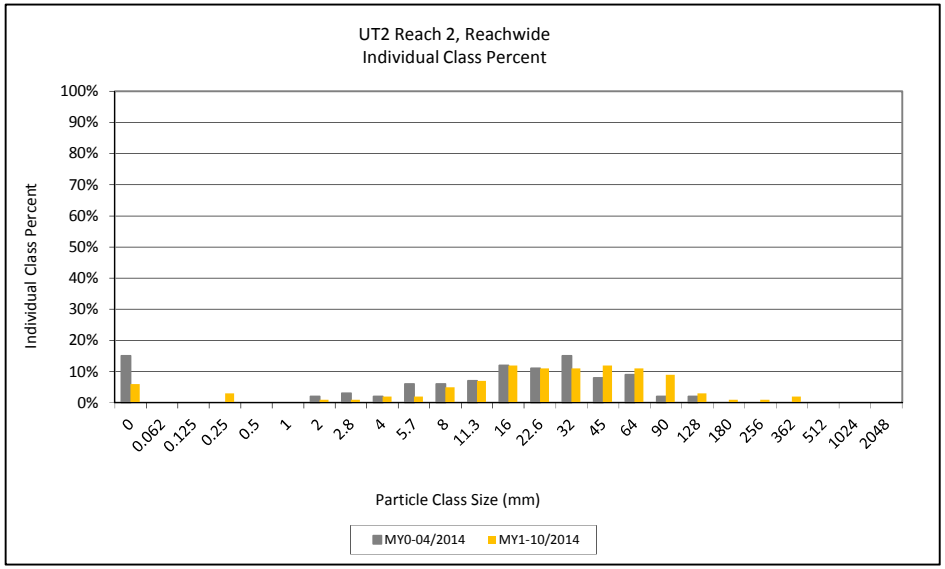
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 2, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			UT2 Reach 2 Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		6	6	6	6
SAND	Very fine	0.062	0.125			0	0	6
	Fine	0.125	0.250			0	0	6
	Medium	0.250	0.500	2	1	3	3	9
	Coarse	0.5	1.0			0	0	9
	Very Coarse	1.0	2.0			0	0	9
GRAVEL	Very Fine	2.0	2.8		1	1	1	10
	Very Fine	2.8	4.0		1	1	1	11
	Fine	4.0	5.7		2	2	2	13
	Fine	5.7	8.0	1	1	2	2	15
	Medium	8.0	11.3	1	4	5	5	20
	Medium	11.3	16.0	2	5	7	7	27
	Coarse	16.0	22.6	6	6	12	12	39
	Coarse	22.6	32	7	4	11	11	50
	Very Coarse	32	45	4	7	11	11	61
	Very Coarse	45	64	6	6	12	12	73
COBBLE	Small	64	90	8	3	11	11	84
	Small	90	128	6	3	9	9	93
	Large	128	180	3		3	3	96
	Large	180	256	1		1	1	97
BOULDER	Small	256	362	1		1	1	98
	Small	362	512	2		2	2	100
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	8.5
D_{35} =	20.1
D_{50} =	32.0
D_{84} =	90.0
D_{95} =	160.7
D_{100} =	512.0

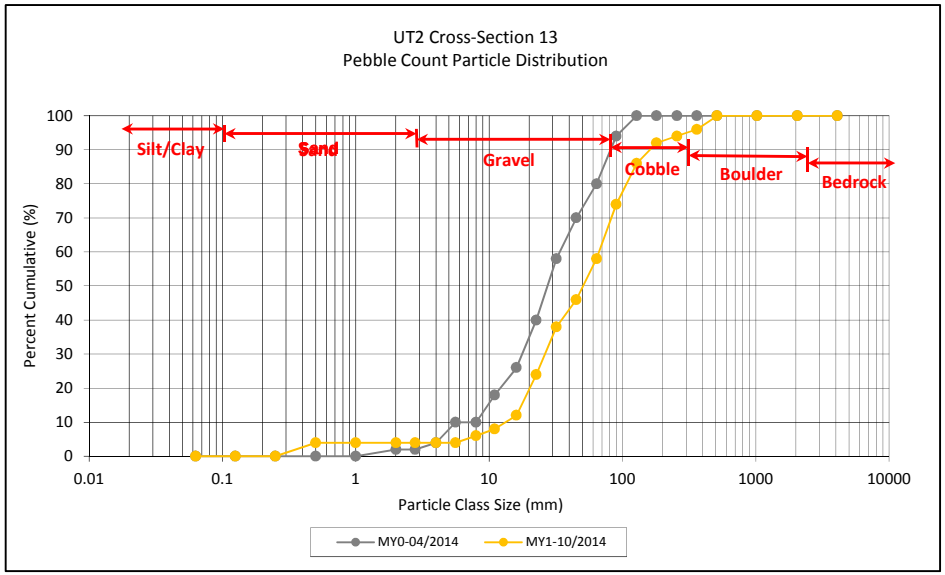


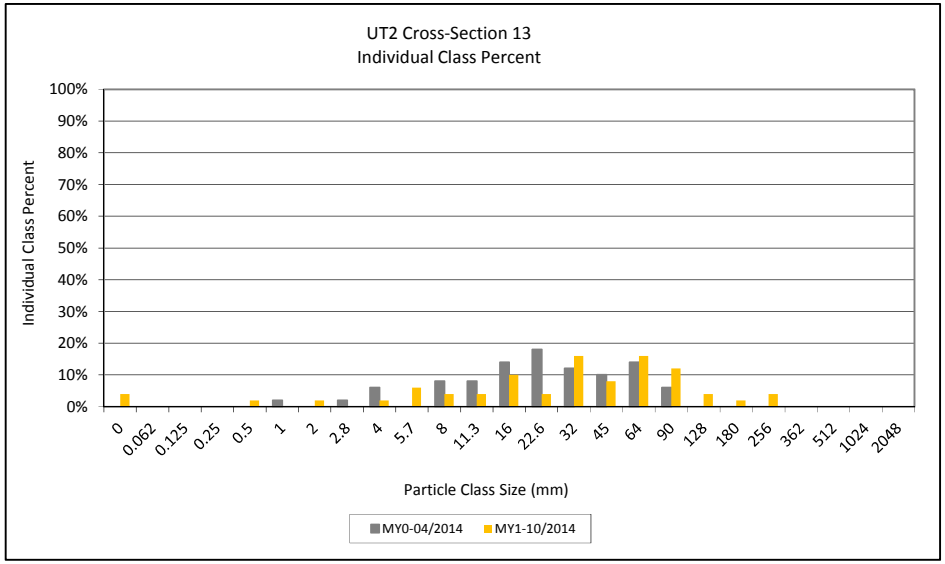


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 2, Cross-Section 13
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 13 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500	4	4	4
	Coarse	0.5	1.0			4
	Very Coarse	1.0	2.0			4
GRAVEL	Very Fine	2.0	2.8			4
	Very Fine	2.8	4.0			4
	Fine	4.0	5.7			4
	Fine	5.7	8.0	2	2	6
	Medium	8.0	11.3	2	2	8
	Medium	11.3	16.0	4	4	12
	Coarse	16.0	22.6	12	12	24
	Coarse	22.6	32	14	14	38
	Very Coarse	32	45	8	8	46
	Very Coarse	45	64	12	12	58
COBBLE	Small	64	90	16	16	74
	Small	90	128	12	12	86
	Large	128	180	6	6	92
	Large	180	256	2	2	94
BOULDER	Small	256	362	2	2	96
	Small	362	512	4	4	100
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

Cross-Section 13	
Channel materials (mm)	
D_{16} =	18.0
D_{35} =	29.7
D_{50} =	50.6
D_{84} =	120.7
D_{95} =	304.4
D_{100} =	512.0

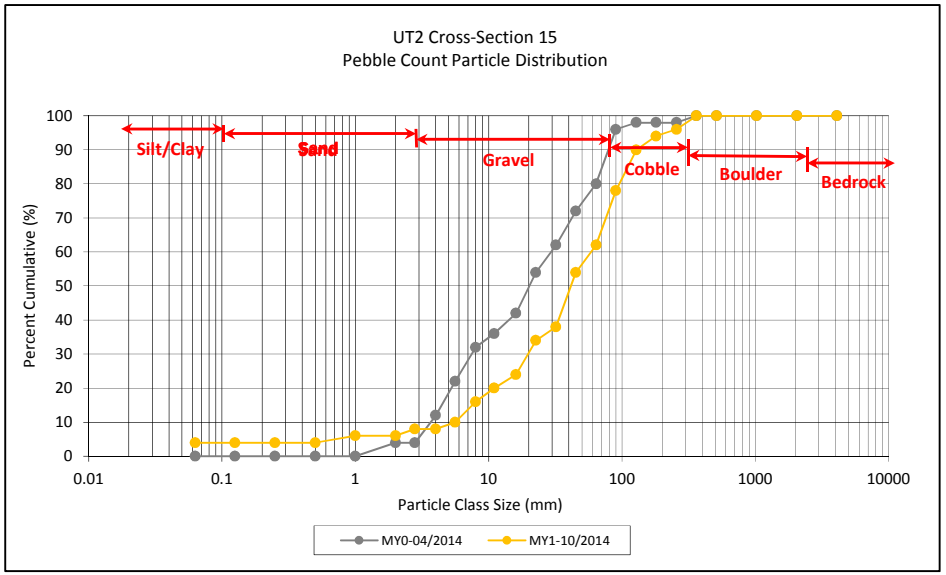


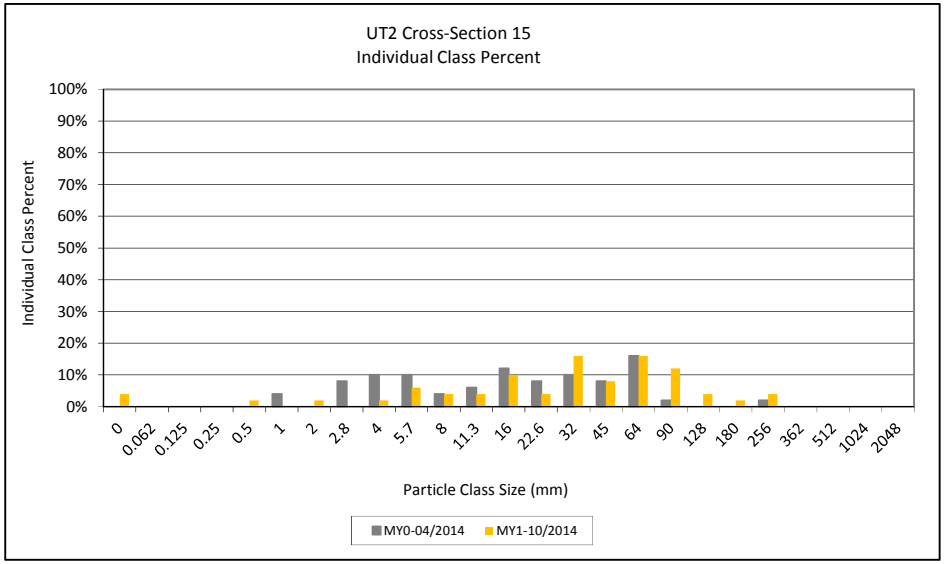


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 2, Cross-Section 15
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 15 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	4	4	4
SAND	Very fine	0.062	0.125			4
	Fine	0.125	0.250			4
	Medium	0.250	0.500			4
	Coarse	0.5	1.0	2	2	6
	Very Coarse	1.0	2.0			6
GRAVEL	Very Fine	2.0	2.8	2	2	8
	Very Fine	2.8	4.0			8
	Fine	4.0	5.7	2	2	10
	Fine	5.7	8.0	6	6	16
	Medium	8.0	11.3	4	4	20
	Medium	11.3	16.0	4	4	24
	Coarse	16.0	22.6	10	10	34
	Coarse	22.6	32	4	4	38
	Very Coarse	32	45	16	16	54
	Very Coarse	45	64	8	8	62
COBBLE	Small	64	90	16	16	78
	Small	90	128	12	12	90
	Large	128	180	4	4	94
	Large	180	256	2	2	96
BOULDER	Small	256	362	4	4	100
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

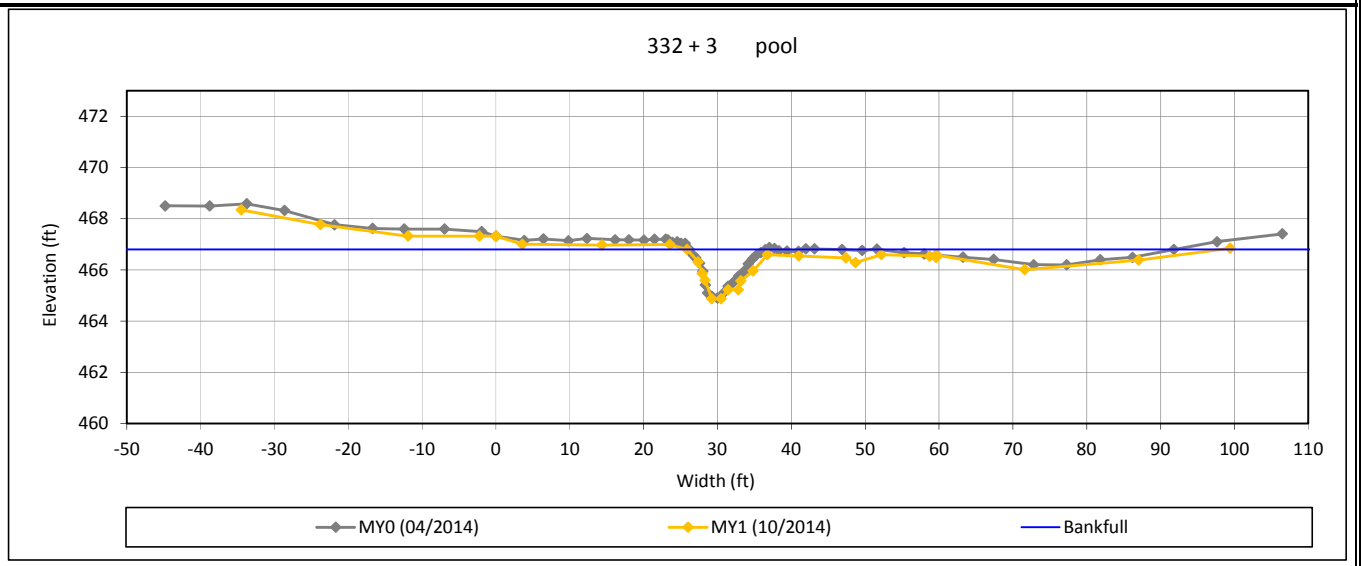
Cross-Section 15	
Channel materials (mm)	
D_{16} =	8.0
D_{35} =	24.7
D_{50} =	41.3
D_{84} =	107.3
D_{95} =	214.7
D_{100} =	362.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 17-UT2 Reach 3A



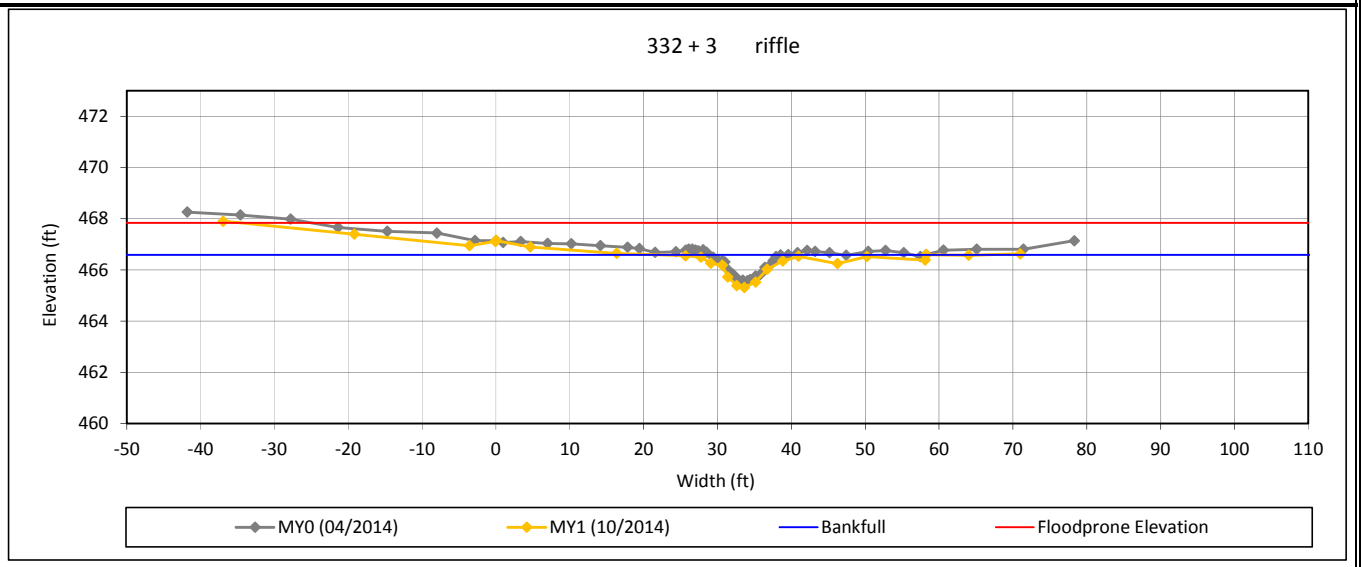
Bankfull Dimensions	
12.9	x-section area (ft.sq.)
10.9	width (ft)
1.2	mean depth (ft)
2.0	max depth (ft)
11.8	wetted parimeter (ft)
1.1	hyd radi (ft)
9.2	width-depth ratio

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

View Downstream

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 18-UT2 Reach 3A



Bankfull Dimensions	
7.6	x-section area (ft.sq.)
11.1	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
11.4	wetted parimeter (ft)
0.7	hyd radi (ft)
16.2	width-depth ratio

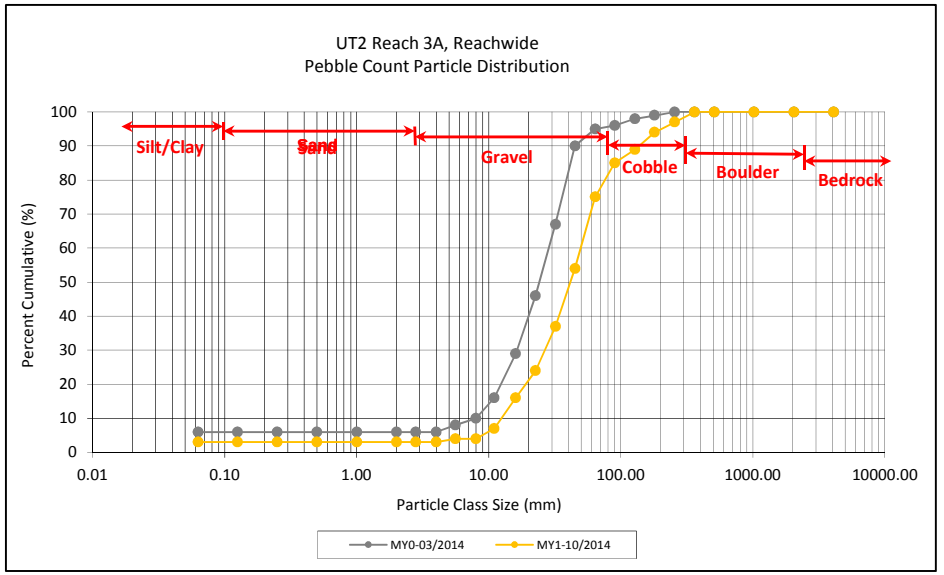
Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

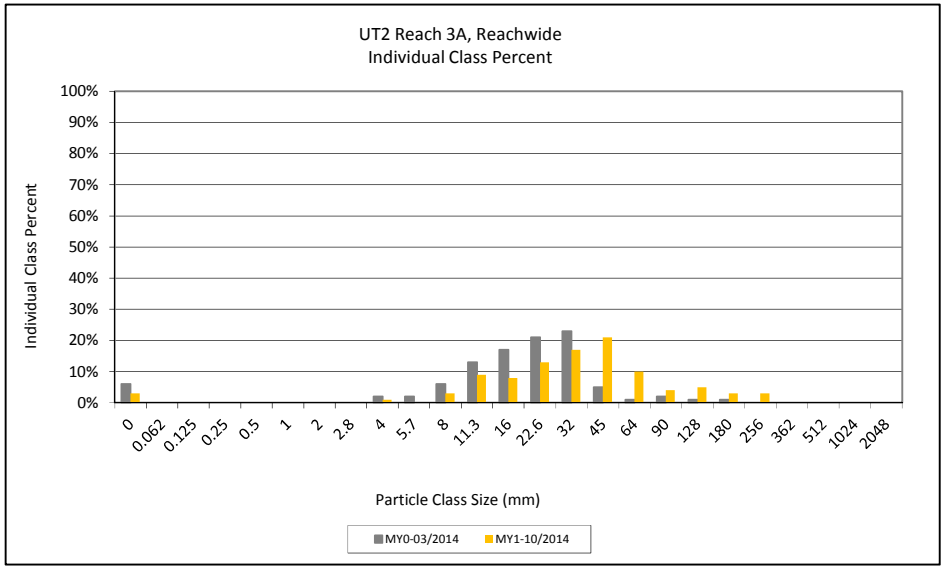
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3A, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			UT2 Reach 3A Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		3	3	3	3
SAND	Very fine	0.062	0.125			0	0	3
	Fine	0.125	0.250			0	0	3
	Medium	0.250	0.500			0	0	3
	Coarse	0.5	1.0			0	0	3
	Very Coarse	1.0	2.0			0	0	3
GRAVEL	Very Fine	2.0	2.8			0	0	3
	Very Fine	2.8	4.0			0	0	3
	Fine	4.0	5.7		1	1	1	4
	Fine	5.7	8.0			0	0	4
	Medium	8.0	11.3	1	2	3	3	7
	Medium	11.3	16.0	3	6	9	9	16
	Coarse	16.0	22.6	2	6	8	8	24
	Coarse	22.6	32	7	6	13	13	37
	Very Coarse	32	45	10	7	17	17	54
	Very Coarse	45	64	10	11	21	21	75
COBBLE	Small	64	90	5	5	10	10	85
	Small	90	128	4		4	4	89
	Large	128	180	4	1	5	5	94
	Large	180	256	2	1	3	3	97
BOULDER	Small	256	362	2	1	3	3	100
	Small	362	512					
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	16.0
D_{35} =	30.3
D_{50} =	41.5
D_{84} =	87.0
D_{95} =	202.4
D_{100} =	362.0

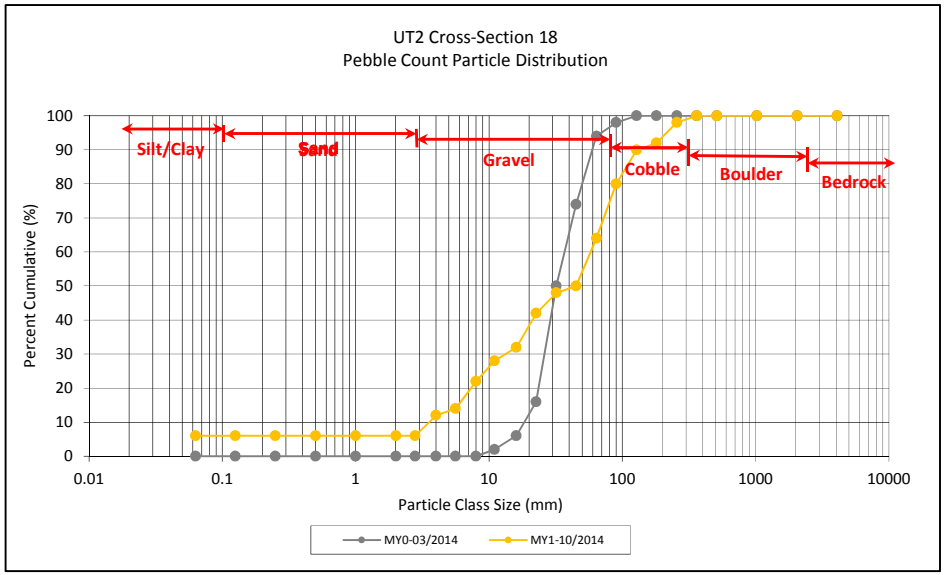


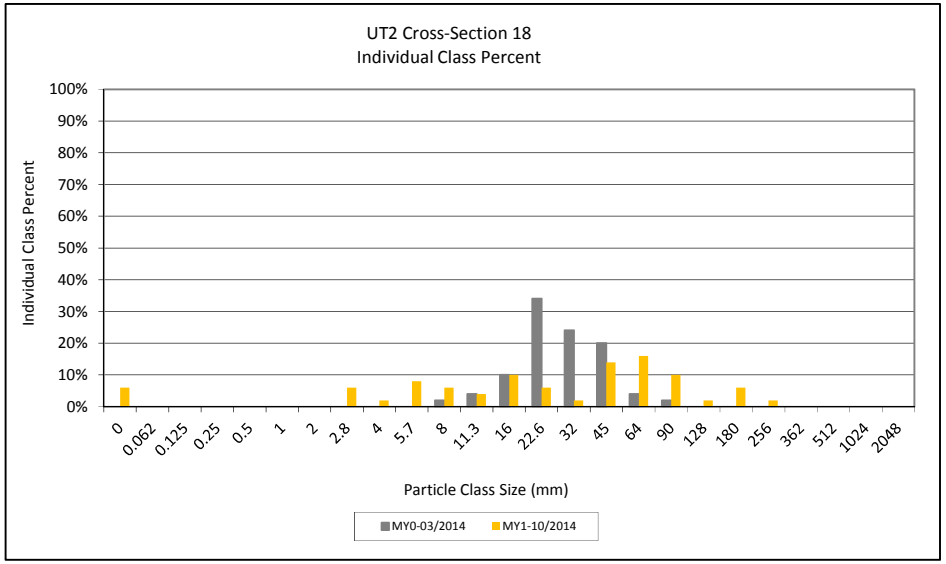


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3A, Cross Section 18
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 18 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	6	6	6
SAND	Very fine	0.062	0.125			6
	Fine	0.125	0.250			6
	Medium	0.250	0.500			6
	Coarse	0.5	1.0			6
	Very Coarse	1.0	2.0			6
GRAVEL	Very Fine	2.0	2.8			6
	Very Fine	2.8	4.0	6	6	12
	Fine	4.0	5.7	2	2	14
	Fine	5.7	8.0	8	8	22
	Medium	8.0	11.3	6	6	28
	Medium	11.3	16.0	4	4	32
	Coarse	16.0	22.6	10	10	42
	Coarse	22.6	32	6	6	48
	Very Coarse	32	45	2	2	50
	Very Coarse	45	64	14	14	64
COBBLE	Small	64	90	16	16	80
	Small	90	128	10	10	90
	Large	128	180	2	2	92
	Large	180	256	6	6	98
BOULDER	Small	256	362	2	2	100
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

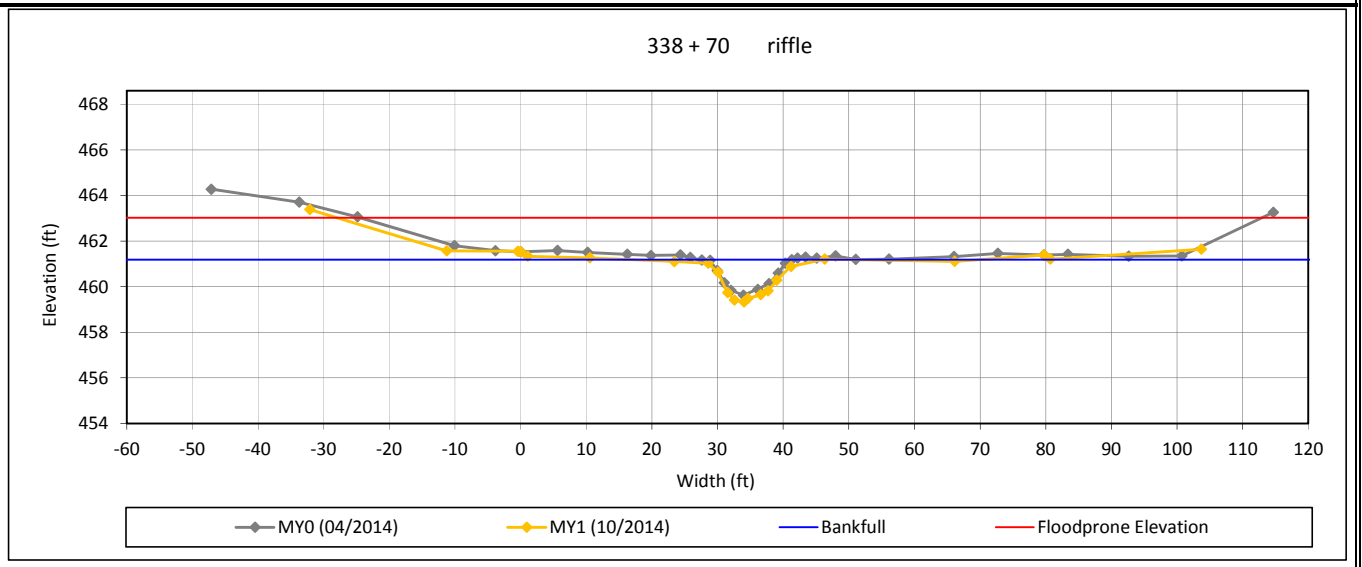
Cross-Section 18	
Channel materials (mm)	
D_{16} =	6.1
D_{35} =	17.7
D_{50} =	45.0
D_{84} =	103.6
D_{95} =	214.7
D_{100} =	362.0





Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 19-UT2 Reach 3B



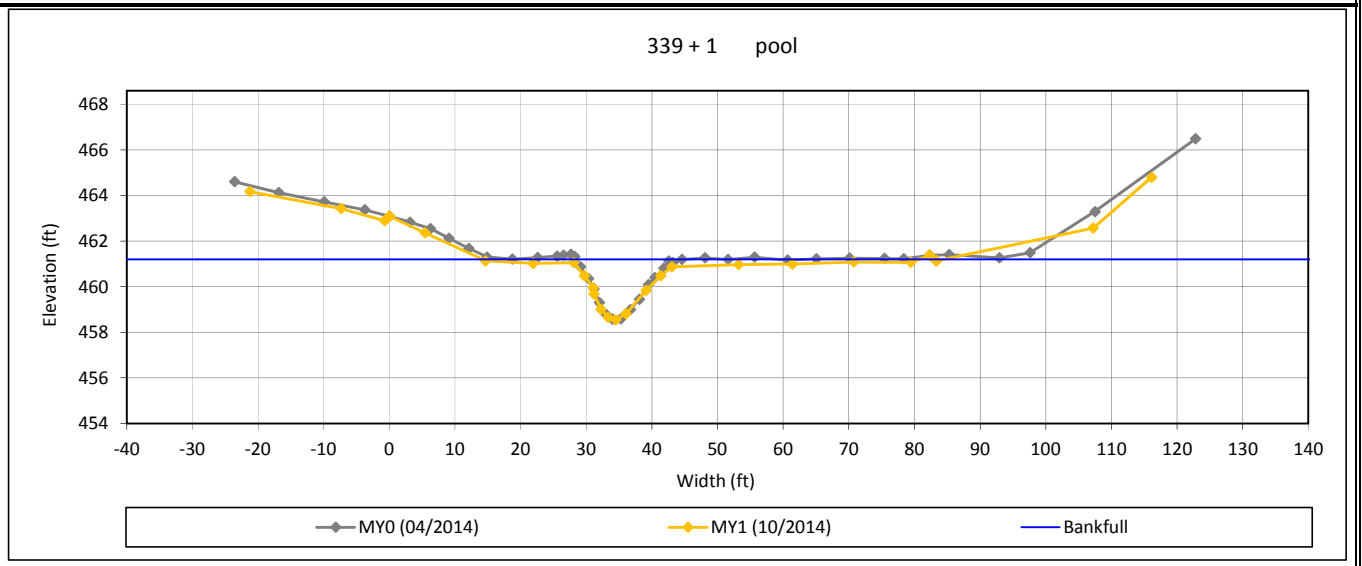
Bankfull Dimensions	
14.9	x-section area (ft.sq.)
12.6	width (ft)
1.2	mean depth (ft)
1.8	max depth (ft)
13.1	wetted parimeter (ft)
1.1	hyd radi (ft)
10.6	width-depth ratio

View Downstream

Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

Cross-Section Plots
Norkett Branch Stream Mitigation Site (Project No. 95360)
Monitoring Year 1

Cross Section 20-UT2 Reach 3B



Bankfull Dimensions	
22.7	x-section area (ft.sq.)
15.0	width (ft)
1.5	mean depth (ft)
2.7	max depth (ft)
15.9	wetted parimeter (ft)
1.4	hyd radi (ft)
9.9	width-depth ratio

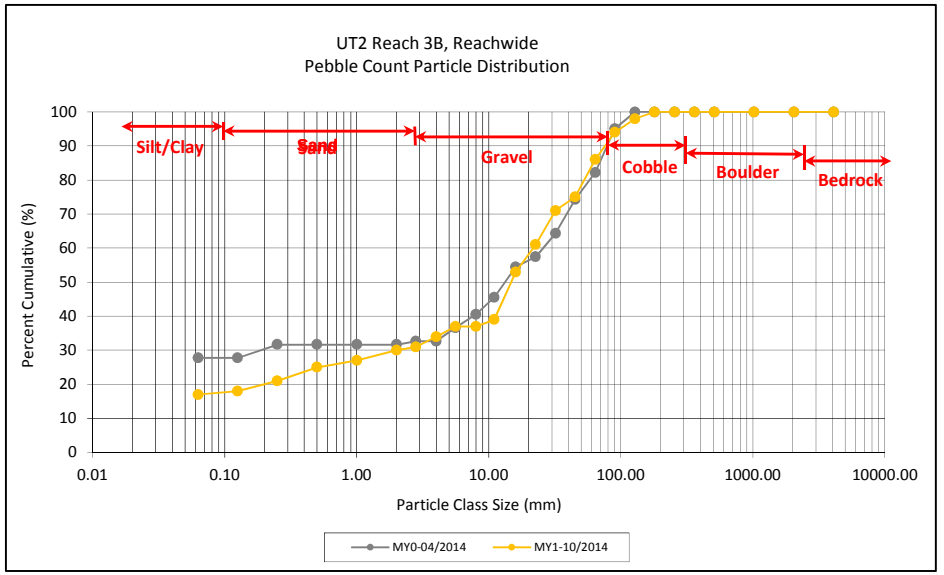
Survey Date: October 2014
Field Crew: Wildlands Engineering, Inc.

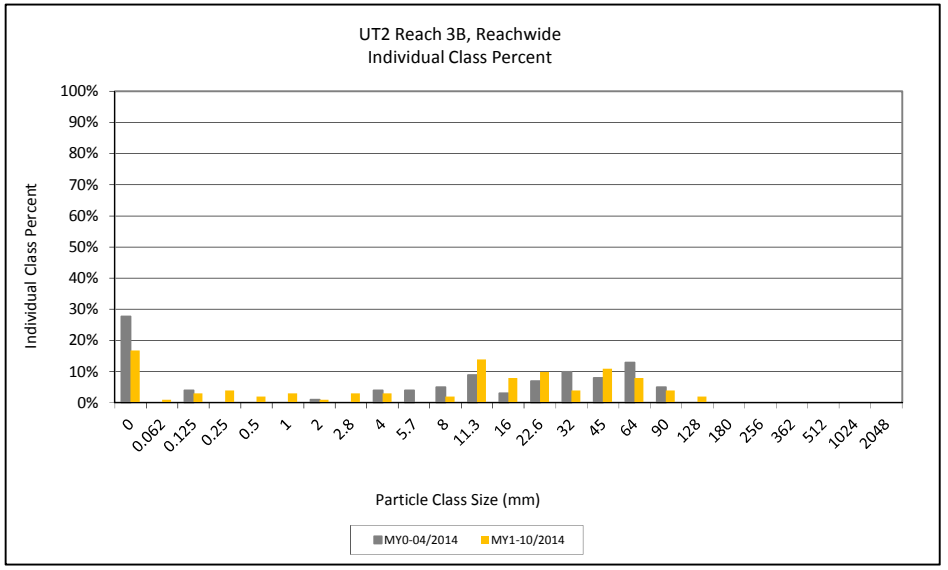
View Downstream

Reachwide and Cross-Section Pebble Count Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3B, Reachwide
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count			UT2 Reach 3B Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	16	17	17	17
SAND	Very fine	0.062	0.125		1	1	1	18
	Fine	0.125	0.250		3	3	3	21
	Medium	0.250	0.500		4	4	4	25
	Coarse	0.5	1.0	1	1	2	2	27
	Very Coarse	1.0	2.0		3	3	3	30
GRAVEL	Very Fine	2.0	2.8		1	1	1	31
	Very Fine	2.8	4.0	1	2	3	3	34
	Fine	4.0	5.7		3	3	3	37
	Fine	5.7	8.0			0	0	37
	Medium	8.0	11.3	1	1	2	2	39
	Medium	11.3	16.0	11	3	14	14	53
	Coarse	16.0	22.6	5	3	8	8	61
	Coarse	22.6	32	5	5	10	10	71
	Very Coarse	32	45	3	1	4	4	75
	Very Coarse	45	64	9	2	11	11	86
COBBLE	Small	64	90	7	1	8	8	94
	Small	90	128	4		4	4	98
	Large	128	180	2		2	2	100
	Large	180	256					
BOULDER	Small	256	362					
	Small	362	512					
	Medium	512	1024					
	Large/Very Large	1024	2048					
BEDROCK	Bedrock	2048	>2048					
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	4.5
D_{50} =	14.8
D_{84} =	60.0
D_{95} =	98.3
D_{100} =	180.0

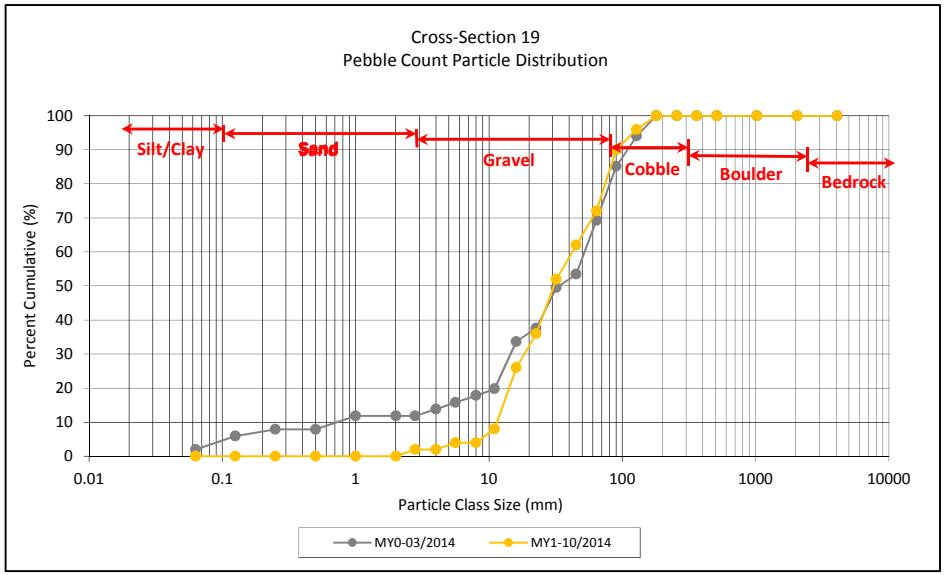


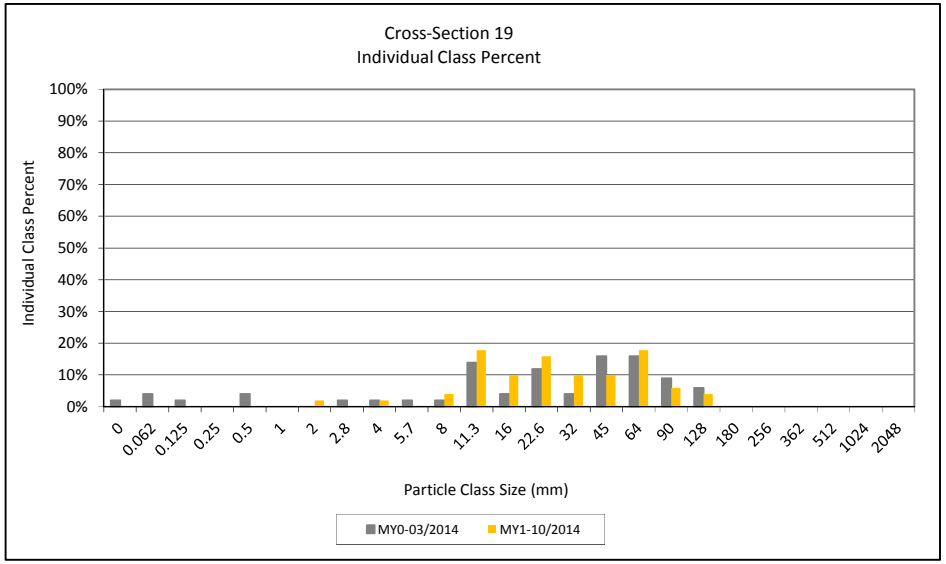


Reachwide and Cross-Section Substrate Plots
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
UT2 Reach 3B, Cross Section 19
Monitoring Year 1

Particle Class		Diameter (mm)		Particle Count	Cross-Section 19 Summary	
		min	max	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.250	0.500			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8	2	2	2
	Very Fine	2.8	4.0			2
	Fine	4.0	5.7	2	2	4
	Fine	5.7	8.0			4
	Medium	8.0	11.3	4	4	8
	Medium	11.3	16.0	18	18	26
	Coarse	16.0	22.6	10	10	36
	Coarse	22.6	32	16	16	52
	Very Coarse	32	45	10	10	62
	Very Coarse	45	64	10	10	72
COBBLE	Small	64	90	18	18	90
	Small	90	128	6	6	96
	Large	128	180	4	4	100
	Large	180	256			
BOULDER	Small	256	362			
	Small	362	512			
	Medium	512	1024			
	Large/Very Large	1024	2048			
BEDROCK	Bedrock	2048	>2048			
			Total	**100**	**100**	**100**

Cross-Section 19	
Channel materials (mm)	
D_{16} =	13.0
D_{35} =	21.8
D_{50} =	30.6
D_{84} =	80.3
D_{95} =	120.7
D_{100} =	180.0



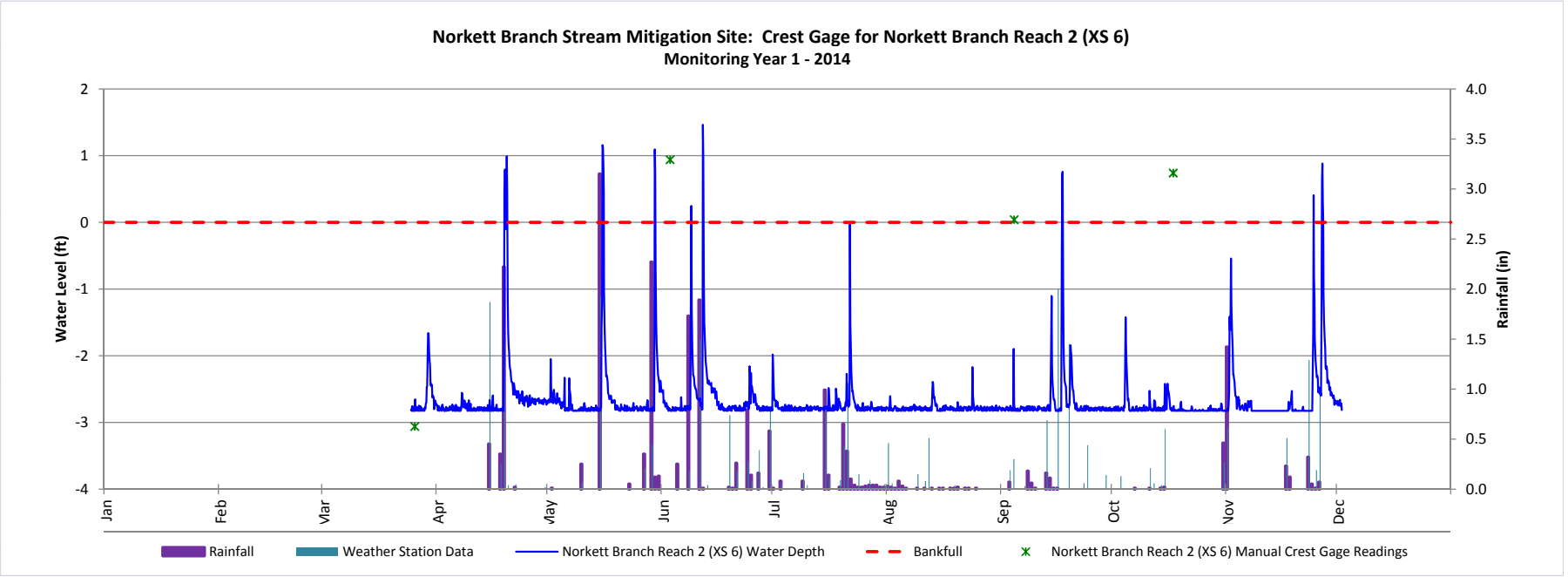


APPENDIX 5. Hydrology Data

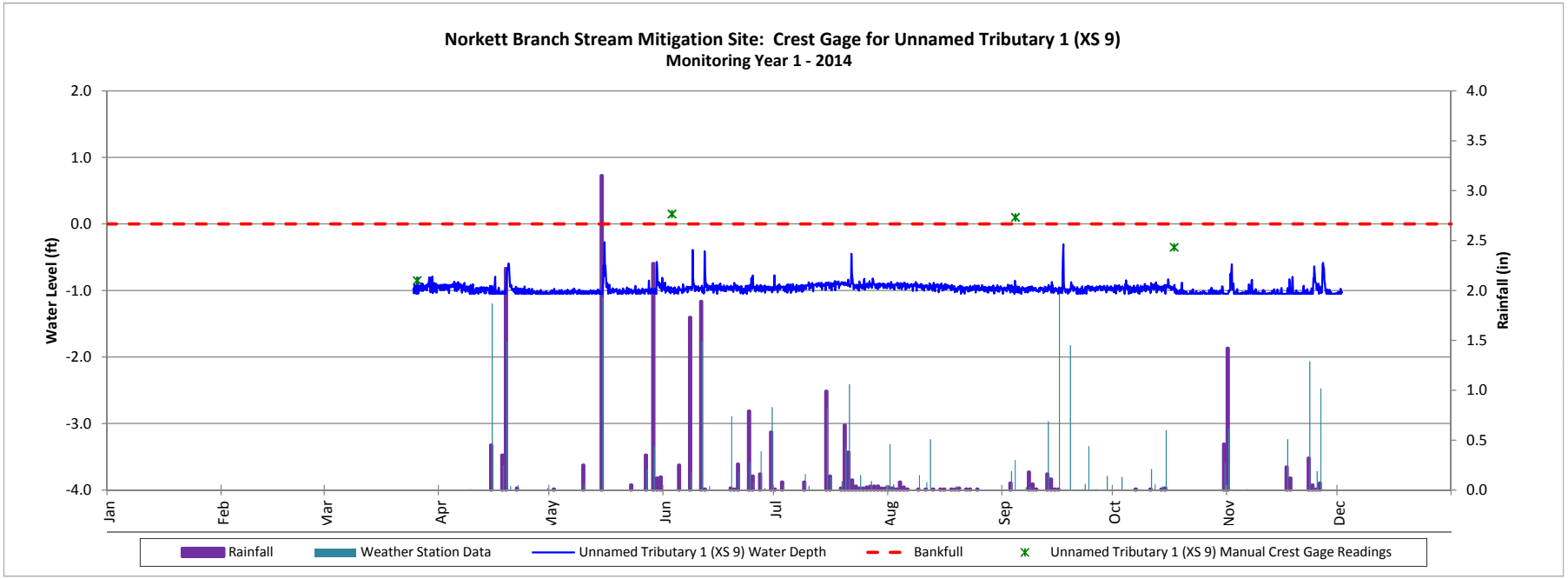
Table 13. Verification of Bankfull Events
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1 - 2014

Monitoring Year	Reach	Date of Data Collection	Date of Occurrence	Method
MY1	Norkett Branch Reach 2	6/3/2014	5/30/2014	Crest Gage
	UT1	6/3/2014	5/30/2014	Crest Gage
	UT2 Reach 3b	6/3/2014	5/30/2014	Crest Gage
	Norkett Branch Reach 2	9/4/2014	7/21/2014	Crest Gage
	UT1	9/4/2014	7/21/2014	Crest Gage
	UT2 Reach 3b	9/4/2014	7/21/2014	Crest Gage
	Norkett Branch Reach 2	10/17/2014	9/16/2014	Crest Gage
	UT2 Reach 3b	10/17/2014	9/16/2014	Wrack Line

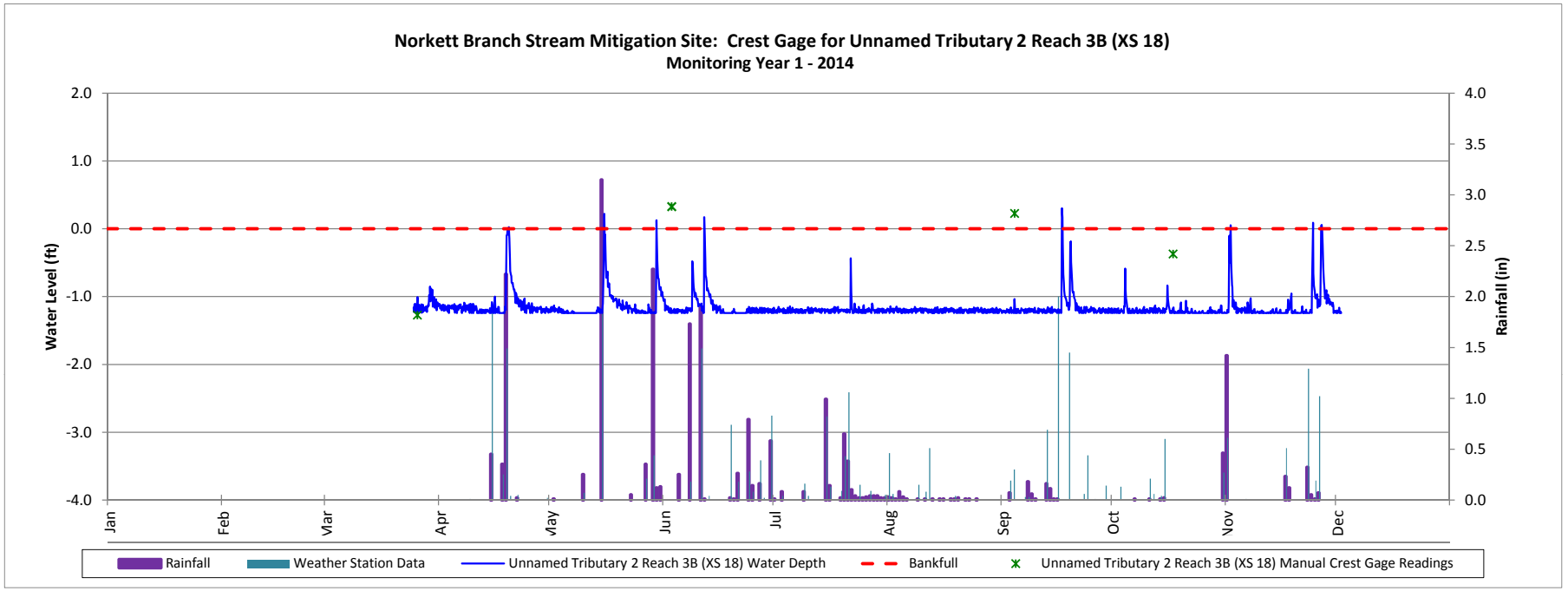
Recorded Bankfull Events
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1 - 2014



Recorded Bankfull Events
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1 - 2014



Recorded Bankfull Events
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1 - 2014



APPENDIX 6. Water Quality BMPs

Table 14 Water Quality Sampling Results
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Location	Sample Collection Date	TN (mg/L)	NO_x (mg/L)	TKN (mg/L)	TP (mg/L)	TSS (mg/L)	FC (CFU/100mL)	Conductivity (µS/cm)	Temp °C	pH
SPSC BMP Inlet	4/22/2014 (Baseflow)	1.1	0.2	0.9	0.4	16.0	31	151.0	21.4	7.0
SPSC BMP Outlet		0.9	(< 0.1)	0.9	0.5	25.0	11	127.6	23.5	7.3
PW BMP Inlet		(< 0.6)	(< 0.1)	0.5	0.2	11.0	68	65.0	25.3	7.4
PW BMP Outlet		(< 0.6)	0.1	(< 0.5)	0.3	39.0	110	69.8	26.2	7.0
SPSC BMP Inlet	5/15/2014	100.0	50.0	50.0	19.0	970.0	20000	1230.0	21.0	6.8
SPSC BMP Outlet		47.0	18.0	29.0	7.0	410.0	20000	1185.0	21.0	6.9
PW BMP Inlet		2.5	0.2	2.3	0.6	15.0	5600	95.5	22.9	6.9
PW BMP Outlet		1.8	0.2	1.6	0.5	150.0	2100	11.3	23.8	6.9
SPSC BMP Inlet	10/15/2014	5.5	1.3	4.2	5.4	27.0	490	437.0	19.8	7.1
SPSC BMP Outlet		1.8	0.2	1.7	0.7	1.7	2300	333.0	21.0	7.1
PW BMP Inlet		NF								
PW BMP Outlet										
SPSC BMP Inlet	11/26/2014	7.2	2.2	5.0	5.0	30.0	HT	201.1	10.1	7.2
SPSC BMP Outlet		6.5	2.0	4.6	4.9	32.0		196.2	10.0	7.2
PW BMP Inlet		2.8	1.1	1.7	0.6	6.6		57.8	11.2	6.7
PW BMP Outlet		2.6	1.0	1.7	1.0	6.3		82.0	11.1	6.8

NF: No flow was available for sample collection

HT: Laboratory analysis was not available due to the short holding time for this parameter

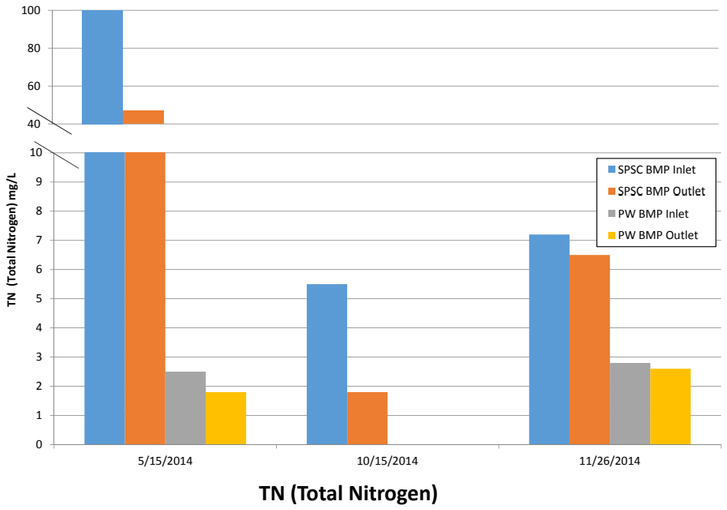
Table 15 Pollutant Removal Rates
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1

Location	Sample Collection Date	TN	NO_x	TKN	TP *	TSS *	FC *	Conductivity *	Temp °C	pH
SPSC BMP	4/22/2014 (Baseflow)	18%	57%	1%	-29%	-56%	65%	15%	-10%	-3%
PW BMP		N/A	N/A	0%	-74%	-255%	-62%	-7%	-4%	5%
SPSC BMP	5/15/2014	53%	64%	42%	63%	58%	0%	4%	0%	-1%
PW BMP		28%	27%	30%	18%	-900%	63%	88%	-4%	0%
SPSC BMP	10/15/2014	67%	88%	60%	88%	94%	-369%	24%	-6%	0%
PW BMP		N/A								
SPSC BMP	11/26/2014	10%	9%	8%	2%	-7%	N/A	2%	1%	1%
PW BMP		7%	14%	0%	-67%	5%		-42%	1%	-2%

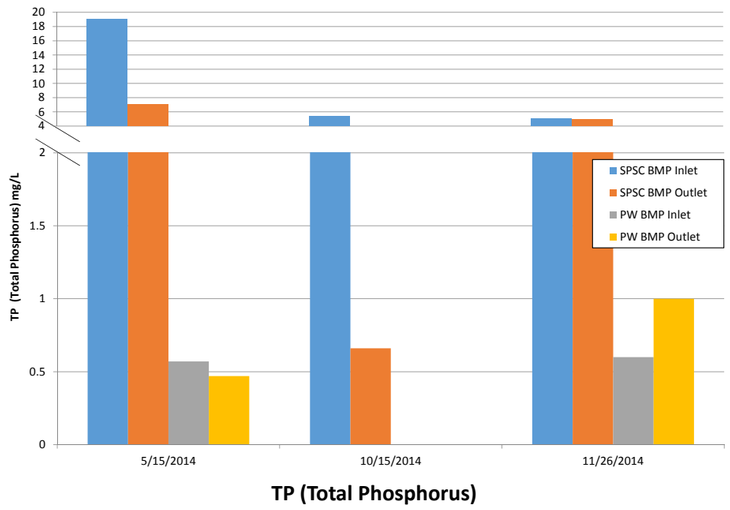
*Negative values indicate that outlet concentrations were elevated from inlet concentrations

N/A: Not applicable

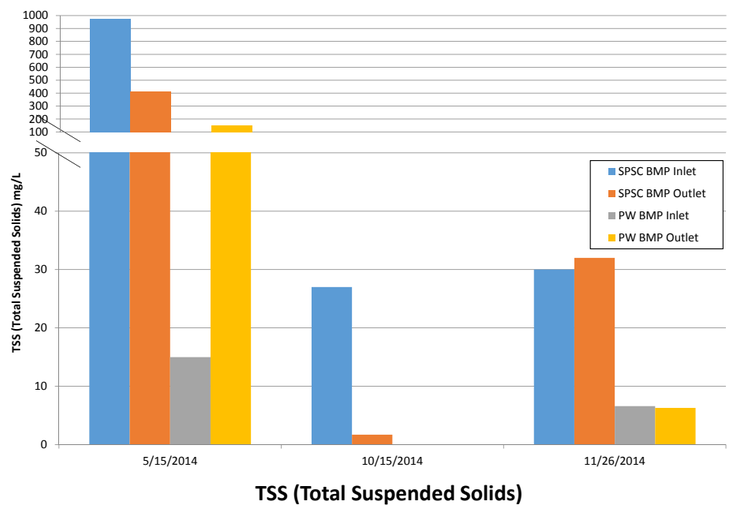
Water Quality Data
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1



TN (Total Nitrogen)



TP (Total Phosphorus)



TSS (Total Suspended Solids)

Pollutant Removal Rates
Norkett Branch Stream Mitigation Site (NCEEP Project No. 95360)
Monitoring Year 1